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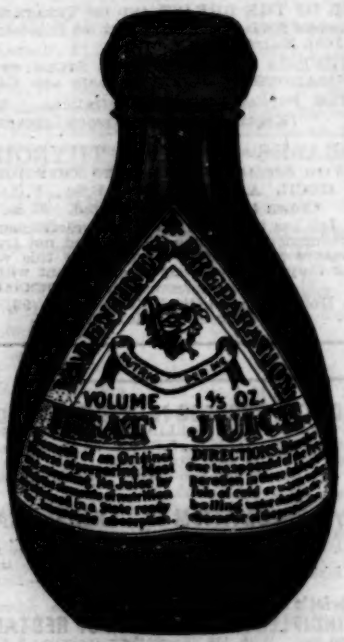

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By Victor Bonney, M.S., B.Sc., F.R.C.S., F.R.A.C.S.
GYNÆCOLOGICAL SURGEON TO THE MIDDLESEX HOSPITAL

Everyone concerned with abdominal section, and most of all perhaps the patient, knows that following the operation a derangement of the stomach and intestines characterised by an excess of gas and disordered peristalsis almost invariably occurs. Its severity varies considerably, but all persons who have had their abdominal cavity opened would agree that the distress caused by the intestinal derangement was the worst part of what they had to suffer.

Clinical Considerations

No matter where the operation area be placed, the derangement begins in the stomach and upper intestine and it rarely appears until the second day after the operation.

The mildest form is in the nature of a wave; at the beginning epigastric distension with belching and some vomiting is present, but after a time the epigastrium flattens, belching ceases, and the distension can be seen to have moved lower down. Later on still it is obviously in the colon, and soon after that flatus is passed per anum with colicky pain. The appearances are as though a charge of gas introduced into the stomach and duodenum was being driven down by peristalsis, the bowel recovering itself once the volume of gas has passed on. When the derangement is more severe, however, the wave-like progression is less marked or wholly absent. The distension progressively extends downwards, but the upper intestine and stomach do not clear themselves with the advance and remain distended until a great length of the intestinal tract is overcharged with gas, the process no longer suggesting a locally produced charge being moved on by peristalsis, but a continually spreading area of gas formation. This is accompanied by more or less persistent vomiting, the vomit assuming the appearance of the contents of the upper intestine; and the condition if persisted in may end in the full appearance of the syndrome of obstruction. There is, however, no hard-and-fast line to be drawn between the grades of severity of the derangement, which even in its mildest form is a reminder and a menace of disastrous possibilities. The derangement manifests itself by excessive gas and disturbed peristalsis, but the proportion borne by each to the total clinical picture varies. In the one extreme there may be no apparent distension but much painful peristalsis, and in the other much distension and no apparent peristalsis; whilst in between lie the much commoner cases in which both distension and excessive peristalsis are present.

There are other clinical facts which need to be noted. Generally speaking, the derangement is more likely to be marked after operations involving a wide area rather than a restricted one, and after those necessitating a large amount of tissue trauma rather than a small amount, but there is no fixed relation between the magnitude of the operation and the degree of the derangement. Much handling and especially rough handling of the intestines is commonly held to promote it, but here again there is nothing constant and great derangement may follow an operation in which the intestines were not only never touched but never even viewed.

The advent and extent of the derangement have further no certain dependence on whether the operation area be septic at the time of the operation or not septic. If in a septic case the abdomen be distended before the operation it will be distended after it, but the distension does not necessarily increase, and if there is no distension before the operation it does not necessarily appear afterwards. One would have imagined that, other things being equal, septic cases would exhibit much more post-operative flatulence than cases not septic; but, if pre-operative distension, which is continued after the operation, be excluded, and attention be directed only to post-operative increase in the intestinal gas, the difference between the two classes of case is not great. Everyone has seen great distension follow an entirely clean operation and a perfectly flat abdomen remain after a very infected one. Post-operative distension is in a general way most marked after operations which it may be surmised effect a considerable alteration in the intra-abdominal pressure as, for instance, ovariotomy or Cæsarean section; but there is no general rule about this nor can the surgeon distinguish beforehand cases likely to distend from cases likely to remain flat. The incisional site has an influence. Incisions situated above the umbilicus, or well out to the side of the abdomen, are less apt to be followed by intestinal derangement than those situated below it or in the middle line. A still greater immunity attends operations where the incisions open an annex of the peritoneal cavity as, for instance, inguinal and femoral herniotomy, vaginal hysterectomy, and the intentional or accidental opening of the peritoneum through a loin incision. A remarkable fact in this connexion is the relative freedom from intestinal derangement that pertains to a transverse skin incision in the pubic-hair area with vertical division of the aponeurosis and peritoneum. The derangement is on the whole commoner in elderly than in young patients; this is certainly true of its extreme form, functional obstruction ("paralytic ileus"). Further, it has to be noted that great intestinal distension may follow retroperitoneal nephrectomy and conditions involving the posterior retroperitoneal tissue, like hæmorrhage in that situation, although in neither instance has the peritoneal cavity been opened; and moreover it not infrequently occurs after prostatectomy. I have twice seen it as a spontaneous occurrence during pregnancy and it is sometimes seen as a terminal event in pneumonia.

Origin of the Intestinal Gases

The gases within the stomach and intestine are derived from three sources: (1) air taken into the stomach in the act of swallowing; (2) diffusion through the gastric and intestinal walls of gases in solution in the blood; and (3) chemical changes in the intra-intestinal matter. The proportions normally contributed from these three sources to the total gas content is unknown, but they are probably variable. Experiments by Douglas MacLeod and Kremer have showed that the quantity of air taken into the stomach during swallowing was not only very definite, but that it was greatest when deglutition took place with the individual lying down.

* The Bradshaw lecture delivered before the Royal College of Surgeons of England on Dec. 13th, 1934.

Numerous workers have proved that gases are both diffused through and absorbed into the intestinal wall, the relation between diffusion and absorption being such that a balance is maintained between the partial gas pressure of any particular gas in the lumen and its tension in the blood. Analysis of the gas withdrawn from the stomach and intestine under normal circumstances and after abdominal operations shows a mixture which broadly speaking resembles vitiated atmospheric air. Considerable variations obtain, but on the average N forms the largest component, whilst CO_2 is excessive, and O sparse as compared with air. In addition, varying quantities of H, CH_4, and H_2S are sometimes present. If a volume of air be introduced experimentally the nitrogen component absorbs slowly, but the oxygen component quickly, its place being taken by an amount of diffused CO_2. It would appear that the contribution made by diffusion to the general content chiefly consists of CO_2, and since its diffusion is governed by its tension in venous blood which is 60 mm. of mercury or about one-eighth of an atmosphere, so soon as this partial pressure is reached in the lumen diffusion of the gas ceases.

The contribution normally made by intra-intestinal chemical action is again not known, but the neutralisation of the acid contents of the stomach must furnish a very definite quota, as also must the action of bacteria on certain substances, such as cellulose. Gases like CH_4 and H_2S when present in the intestine must have been formed by chemical action but they are occasional only.

Disposal of the Intestinal Gases

In health the amount of gas introduced into or produced in the intestinal tract is balanced by a mechanism of removal which is made up of two factors—absorption and peristaltic transportation.

Absorption occurs when the pressure of any particular gas in the lumen exceeds its tension in the blood, but the *amount* absorbed depends upon the rate at which the blood can carry it away—i.e., on the activity of the circulation through the intestinal vessels. That the removal of gas by absorption can be rapid has been proved by experiments on animals and is also demonstrated by the fact that during the period of an abdominal operation the intestines may markedly collapse. Peristalsis gives important aid to absorption by passing on locally produced gas to other parts of the intestine, thereby making available for absorption a much larger area of surface than would otherwise be the case. Gas in excess of what can be dealt with in this way is expelled from the body. The amount of gas daily passed per anum varies in individuals, but in the young and healthy it is not as a rule great, and may be none at all, which shows that in such persons absorption is the principal means by which gas is got rid of.

Intestinal Gas Pressure

The intraperitoneal pressure or the pressure exercised on the abdominal parietes by the intestines as a whole depends on (1) their tendency to expand, (2) their weight, and (3) the presence or absence of muscular contraction of the diaphragm and abdominal muscles. The normal average pressure of the gas within the intestine has been variously estimated, some observers stating it to be above that of the atmosphere and some below. In human beings, if the effects of weight and muscular contraction of the parietes be abrogated by full anæsthesia and the recumbent posture, it appears to be below, for otherwise it seems impossible to account for the phenomenon familiar to all surgeons that on opening the peritoneal cavity the intestines usually fall away instantly from the abdominal wall. Since the tendency of the intestine to expand varies inversely with the resistance of the intestinal wall, it is possible to conceive the resistance of the wall being so great that though the intestinal pressure was very high indeed, no part of the pressure came through to the parietes. Such a condition may be produced locally as the temporary result of peristalsis, but the appearance and feel of the intestines exposed by an abdominal incision show that it is not generally existent.

The pressure of the intestinal gas depends not only on its amount and the resistance of the intestinal wall but is influenced also by the abdominal parietes. Since normally the intestines are everywhere in contact with the abdominal wall and the peritoneal cavity is potential only, we can for simplicity imagine the intestines as consisting of a uniform gas-containing cavity bounded by an envelope whose thickness consists of both the intestinal wall and the abdominal parietes, in the same way as the air contained in a fully inflated tyre is bounded by an envelope composed of the inner tube and the outer cover. The envelope formed by the combined abdominal and intestinal walls opposes to the pressure of the gas contained within it a resistance which is partly mechanical and passive and partly vital and active, and the resistance is reinforced by the atmospheric pressure everywhere applied to the outer surface of the abdominal wall. If the tissues enveloping the intestinal gas were composed of lifeless material, distension could only be effected by raising the gas pressure in the intestine considerably above that of the atmosphere and stretching the envelope; but the case of an envelope composed of living tissues is different, for within limits such envelopes have the power of adapting themselves to the volume of their contents. The classic example of this is the bladder, but the power is also possessed by the tissues that envelope the intestinal gas. Sherrington[1] found that the introduction of as much as 400 c.cm. of water into the stomach of an etherised dog only caused the intragastric pressure to rise 1 cm. of water above atmospheric pressure; whilst Owings, McIntosh, Stone, and Weinberg[2] showed that in dogs experimental intestinal obstruction never caused the intestinal pressure to rise more than 10 cm. of water above that of the atmosphere except during peristalsis.

The question how far this vital adaptation can go in the case of human beings merits consideration, for after it has reached its limit any further distension must be effected by mechanical stretching, and to do this a pressure in the intestine much greater than that of the atmosphere would be required. The presence of such a pressure would be proved by observing that when, under full anæsthesia, the abdominal cavity was opened the intestines not merely protruded but expanded after they protruded. Now all surgeons of experience have seen this phenomenon, but only in cases of very extreme distension, which shows, I think, that the adaptive power of the intestinal and abdominal walls is far greater than is commonly supposed. It is probably at its greatest when the abdominal wall has been already rendered lax by pregnancy or a large tumour, for in cases of this sort a great degree of flatulent distension can exist without untoward symptoms. It seems certain that even under abnormal circumstances the pressure of the intestines as a whole on the abdominal wall (the intraperitoneal pressure)

[1] Sherrington, C.: Brain, 1915, xxxviii., 191.
[2] Owings, McIntosh, Stone, and Weinberg: Arch. of Surg., 1928, xvii., 507.

could not for any length of time rise greatly above atmospheric pressure, for such a pressure would stop the circulation through the abdominal veins.

Up to now we have for simplicity been considering the space within the intestine as a uniform cavity bounded by a uniform envelope. In fact, it is a cavity divided into many compartments, the divisions between which are the various points where the mucosa is in contact either on account of the contraction of the circular fibres or the pressure of adjacent coils. The intestinal gas therefore does not constitute a single gaseous column but a series of columns, which is why the intestine when opened does not collapse throughout its whole length like a punctured tyre. Each column of gas is bounded not only by the wall of its compartment, but by the coils of intestine that surround it. If the amount of gas in any particular column is quickly increased the pressure in that compartment will rise and adjacent compartments will be compressed until the pressure in them rises to somewhere about that in the first compartment. Compartments farther away will be less and less compressed as the force generated by the increased gas content of the first compartment is gradually used up in overcoming the resistance of the walls of the other compartments. Local distension therefore of any segment of the intestine, unless compensated for by withdrawal of gas elsewhere, compresses and raises the pressure in neighbouring coils, so that additional force is required to pass anything into them. It may be surmised that the colic often seen in post-operative intestinal derangement is due to the efforts of the intestinal muscle to force gas and fluid into compressed coils.

Mechanism of Distension

For distension to occur there must be a breakdown of the gas-balancing mechanism, either in the direction of increased production, or diminished removal, or of the two together.

Increased production.—There is no reason to suppose that an abdominal operation increases the amount of air swallowed, since for the first 24 hours at all events the patient not only swallows very little but is often vomiting what is swallowed. Post-operative distension has been ascribed to an accumulation of swallowed air during the period over which intestinal movement is in abeyance; but the theory does not accord with the fact that the distension rarely appears before the second day, by which time the stomach and upper intestine have certainly recovered their mobility. Moreover, if the distension was solely or chiefly the result of swallowing air it should be less marked the more the patient vomited, but the reverse is the case.

McIver, Redfield, and Benedict [3] showed that diffusion of CO_2 into the intestine is increased when the blood flow through the intestinal capillaries is slowed by partial obstruction to the venous return; and on reopening the abdomen of a patient suffering from post-operative intestinal derangement congestion of the mesenteric veins is seen increasingly marked up to the region of the jejunum, the appearance suggesting a vasomotor disturbance. Tyrrell-Gray [4] has demonstrated that distension of the intestine stretches the mesentery with consequent impeding of the flow through its veins, but as considerable distension must already exist before this mechanism can operate, it is contributory to the final state only. Equalisation of the CO_2 pressure in the lumen and the CO_2 tension in the blood must be delayed by the vital relaxation of the intestinal and abdominal walls already referred to, so that the amount diffused must be larger than would be the case if such yielding did not occur; but my friend and colleague, Prof. Samson Wright, to whom I am indebted for much help in this connexion, has pointed out that diffusion at its maximum could not cause the total gas content to be increased more than 10 to 15 per cent.

The part played in the production of distension by chemical changes in the intestinal matter is difficult to assess because little precise knowledge is available. On reopening the wound of a patient in whom severe intestinal derangement has progressed till the symptoms suggest obstruction the intestine is found to contain, besides gas, a large quantity of fluid, more or less corrupt and identical with that which the patient is vomiting. The corruption is usually ascribed to bacterial action, but it is probably in large part the result of obscure biochemical reactions, for enhancement of organismal activity within the intestine is generally accompanied by signs of enteritis, whereas in a case of obstruction the intestinal mucosa viewed during the performance of jejunostomy presents no such signs; moreover, though the upper intestine contains very few organisms, obstruction at that level produces corrupt vomit much more quickly than when it occurs lower down where organisms are plentiful; and further, the symptoms of inflammation of the intestinal mucosa—even to extensive ulceration—are never those of obstruction. That corruptive changes might result in the production of gas, perhaps on a large scale, seems probable, but we have at present no accurate knowledge of the processes at work. Whatever their nature there is every reason to believe that they are also operative, though in lesser degree, in those cases which eventually respond to non-operative measures, and in whom therefore definite knowledge of the state of the intestine is not obtained. On the other hand, the contents of the distended intestine are not the same throughout. As a rule the fluid is most abundant in the upper part, whilst below it extends a long length which though equally distended contains very little matter, so that the amount of gas in any particular segment does not seem to be related to the amount of matter it contains. This might be explained as the effect of peristalsis driving down gas locally produced into parts of the intestine that are empty, but the explanation fails in those cases in which peristalsis seems to be in complete abeyance. On opening the intestine the fluid within it may or may not exhibit visible bubbles. The amount of gas that could be produced by biochemical or bacterial action is not subject to limitations like gas derived from swallowing or diffusion, and could continue to be formed after persistent vomiting, and great pressure in the intestine had abrogated the two latter sources of production.

Diminished removal.—Interference with the venous return in the mesentery retards absorption, and congestion of the mesenteric veins is present in all cases of intestinal derangement in which the abdomen is reopened, and presumably also in those which recover without a second operation. I have already suggested that this congestion is in the first instance vasomotor in origin, and later on it is certainly increased by traction on the mesentery. When distension reaches a sufficiently high grade two other causes of retarded absorption become operative—namely, the effects of the intestinal gas pressure on the capillaries of the intestinal wall and the effect of the intraperitoneal pressure on the veins of the

[3] McIver, Redfield, and Benedict: Amer. Jour. Phys., 1926, lxxvi., 92.
[4] Tyrrell-Gray, H.: THE LANCET, 1920, i., 1299, 1345; Brit. Med. Jour., 1922, i., 253; 1930, i., 1161.

portal system. As the normal pressure in the capillaries is estimated at somewhere between 10 and 30 mm. Hg above atmospheric pressure, and that in the mesenteric veins as being lower still, no very great increase in either the intra-intestinal or intraperitoneal pressure would be required to slow the blood flow through either of them.

Very marked interference with the venous return produces an outpouring of fluid into the lumen of the intestine. If the main vein of a portion of the mesentery of an animal be experimentally ligatured the segment of intestine which it drains becomes distended with fluid not with gas. This is understandable, for such a ligature almost stops the circulation through the segment, so that although the blood in the capillaries is overcharged with CO_2 so little blood flows through them that no considerable quantity of the gas can be diffused. The same phenomenon is seen in acute volvulus and extensive mesenteric thrombosis, the bowel in relation to the lesion being full of blood-stained fluid but little gas. It seems unlikely that vasomotor disturbance by itself could bring about a venous obstruction sufficient to cause exudation of fluid, unless tension on the mesentery and a great rise in intra-abdominal pressure were added; but the rapid accumulation of fluid in the intestine that occurs in cases of post-operative intestinal derangement advanced to the stage of obstruction would appear to be largely due to this conjunction.

Opening the peritoneal cavity is followed by cessation of peristalsis, and this withdraws one factor from the mechanism of gas removal. The cessation in the first instance is the result of the anæsthesia,† but after the effect of this has passed off it is commonly ascribed to sympathetic inhibition. If this is so it acts unequally, for the inhibition is withdrawn early from the stomach, later from the small intestine, and last of all from the large intestine. The length of time over which inhibition can operate is not known, but when peristalsis is long in abeyance some paralysing influence seems probable. Dale [1] has shown that acetylcholine is the transmitter of parasympathetic motor impulses to the intestinal muscle-fibres, and non-formation or neutralisation of this substance is possible. Peristalsis however is shown experimentally to be able to continue after all nervous connexions with the bowel have been severed. In certain cases of post-operative intestinal derangement the cessation of movement affects the whole length of the intestine, but as a rule the cessation is regional, part of the intestine moving vigorously or over-vigorously, whilst the remainder is inert. Experiments on animals show that great distension of the intestine paralyses it, and this is supported by operative experience, whilst a further effect is the creation of multiple kinks between the tightly packed coils, each one of which constitutes a mechanical obstruction. Pre-existent kinks, the result of adhesion, are accentuated by distension until mechanical obstruction may result, and, as I have pointed out, great distension limited to a segment may exercise a pressure on adjacent coils capable of obstructing them.

It is probable that the importance of peristalsis as a factor in gas removal varies in different individuals, for some in health habitually pass but little, whilst others pass a great deal, and this may explain the fact known to all abdominal surgeons that, apart from all other considerations, the liability to distension has a personal element. Taking all the facts cited into consideration it may be concluded that in the creation of distension, diminished removal of gas plays a greater part than increased production, and of the causes of diminishment deficient absorption is the more important.

† Local anæsthesia does not stop peristalsis.

[1] Brit. Med. Jour., 1934, i., 835.

Post-operative Functional Obstruction

The distinction between post-operative intestinal derangement and post-operative functional obstruction is quantitative, not qualitative; and clinically all degrees of severity, between mere temporary flatulence and acute obstructive symptoms, are met with; showing that we are dealing, not with separate entities, but different phases of the same thing. The more marked the distension, the greater the peristaltic abnormality, the longer the passage of flatus is delayed, the more persistent the vomiting and the more corrupt the vomit, the more is obstruction suggested. All surgeons are familiar with those anxious cases in which the question whether to reopen the abdomen is decided, not on specific symptoms, but on the efficacy or otherwise of non-operative measures.

Excluding gross mechanical obstruction, which occurring after an operation is an accident, the condition of the intestine found on such reopening may be thus classified: (1) a kink not in itself sufficient to close the lumen, above which kink the intestine is distended; (2) a similar kink immediately above which the intestine is not distended but empty and flattened whilst above this distension is present; (3) a segment of the intestine, usually the lower coils of the ileum, is empty, flattened, and spastic, whilst above this portion the bowel is distended. Sometimes there are two spastic segments, the "ileus duplex" of Handley; and (4) distension without either kink or spastic segment. The distension may be universal over the entire length of the bowel or limited to a part of it; for instance, the jejunal coils may be alone affected.

The state of the distended intestine is the same in all the four findings described. Its lower part contains much gas but very little fluid or solid matter; whereas its upper part is heavy with the presence of much fluid as well as gas. The fluid is not the normal contents of that part of the intestine but has undergone more or less corruption, even to fæcalisation, and it forms the reservoir from which the vomit is derived. The whole length of the distended section exhibits evidence of vascular disturbance but this is increasingly marked as the bowel is ascended, and reaches its maximum in the upper coils of the jejunum. Here the intestine is purple in colour with occasional dark transverse lines, probably caused by capillary stasis, whilst the mesenteric vessels and particularly the veins are engorged.

The problem of obstruction due to functional failure of the intestine to propel its contents downwards is more complicated than that of mechanical obstruction; for in the latter the mechanism of arrest and the lesion causing it are one and the same thing, whereas in the former they are separate. The subject of functional obstruction is, however, best approached through certain considerations concerning mechanical obstruction. Treves, lecturing in this theatre 50 years ago, stated that "as an abstract proposition obstruction to the lumen of the bowel for a period of a week or more, is not in itself, all other circumstances being disregarded, a condition which need cause death or even distressing inconvenience." The pronouncement is true because of the introduced time limit. If that be taken away, the statement to be correct would need enunciating thus: "Obstruction of the lumen of the bowel, all

other circumstances being disregarded, is the slowest way of producing the syndrome of obstruction." This is exemplified by a terminal colostomy, which may be left unopened for four or five days, during which the absolute obstruction produces no symptoms. I recall a case in which a surgeon included a loop of small intestine in a ligature, not knowing he had done so, and cut it away with the tumour he was removing. For several days after the operation the patient presented no untoward symptoms whatsoever. Nevertheless, persistence of the obstruction eventually produces the obstruction syndrome, as in the case of a colostomy if the bowel was not opened, or as finally happened in the surgical accident I speak of.

In strangulation of Meckel's diverticulum the mechanical obstruction only affects the intestinal flow from a backwater, leaving the main stream uninterfered with; but intestinal derangement culminating in the obstruction syndrome develops, because the motor and vasomotor phenomena characteristic of functional obstruction are induced in the continuity of the intestine. Some agent must be transferred, or the effect of some agent transmitted from the diverticulum to the continuity of the intestine to effect this. Strangulation of a partial (Richter's) hernia produces the obstruction syndrome although no mechanical obstruction of any sort exists, and again, some agent (presumably the same as that formed in the case of the strangled diverticulum) must be transferred from the area of strangulation to the continuity of the intestine, which induces the motor and vasomotor effects that characterise functional obstruction.

We can extend this hypothesis to mechanical obstruction in the continuity of the intestine, by visualising the strangled portion of the intestinal wall in a partial hernia to be increased in area until closure of the lumen is produced. The local situation remains so far as the lesion is concerned, but mechanical obstruction is added. Since, however, by our hypothesis, an agent is being generated in the lesion which of itself will produce functional obstruction, the difference made by adding mechanical obstruction will be relative to the rapidity and completeness with which the agent brings functional obstruction about. If this is effected rapidly, the fact that at the same time the lesion mechanically closes the lumen will make little or no difference to the course of events.

In this illustration mechanical obstruction is superimposed on functional obstruction. Let us now consider the much more common event of functional obstruction being superimposed on mechanical obstruction. Though all lesions causing mechanical arrest produce the obstruction syndrome, some cause it to appear with great rapidity; whilst others, though at the same level, produce it very slowly; as for instance, the contrast between the effects of an unopened terminal colostomy and volvulus of the colon; and this difference must depend on whether the lesion causing mechanical arrest does, or does not, generate the agent of functional obstruction; and if it does, then with what violence and rapidity.

Of the intestinal lesions constantly giving rise to the syndrome of obstruction, those in which the blood flow through the area of the lesion is impeded by venous blockage give rise to it most violently of all, as for instance experimental intestinal torsion or ligature of a main mesenteric vein in animals, and volvulus, strangulated hernia, and mesenteric thrombosis in clinical practice. I pointed out in 1910 that an area of tissue whose blood circulation has been interfered with but not entirely cut off, by partial strangulation or a sub-occluding ligature, is in a state analogous to that which obtains in red infarction, and like the latter, exhibits a peculiar irritancy to the tissues in its neighbourhood; and that some substance must be generated in the blood-soaked area to effect this. It may be suggested that, when such an area affects the intestine, the substance is identical with the hypothetical agent concerned in the production of functional obstruction.

On the other hand, lesions unaccompanied by vascular interference, such as simple ligature of the intestine in animals and surgical suture of the bowel end, or accompanied by complete interference, as in the case of the surgical accident I have described, produce the obstruction syndrome much more slowly. A considerable portion of the intestinal wall may be included in a surround ligature with impunity, even when, as in the case of the appendix, a portion of mucosa is included; whereas, spontaneous strangulation of an equal area results in the symptoms of obstruction. The fact that inflammatory states of the intestinal wall even to the extent of gangrene, like gangrenous appendicitis, do not commonly produce symptoms of obstruction, may be explained by the fact that the vascular arrest bringing about the gangrene is a complete one. It also supports the conclusion that the agent I have hypothesised is not generated by bacterial action.

The addition of functional arrest to mechanical arrest has the effect of raising the level of arrest, and animal experiments and clinical experience conclusively prove that the higher the arrest the more violent are the symptoms; but beyond this, the motor disturbance is accompanied by a vasomotor disturbance that results in the accumulation of gas and fluid in the intestine. Thus the different course of events in volvulus of the colon and an unopened terminal colostomy to which I have referred, is explained by the fact that, though the lesions causing mechanical arrest are at the same level, functional arrest at a much higher level and accompanied by a vasomotor disturbance of the mesenteric vessels is operative in the one case but not in the other.

It is necessary to distinguish between functional obstruction directly dependent on a lesion causing mechanical arrest, and the arrest finally induced by the paralysing effect of extreme gaseous distension and toxic intestinal matter. The appearance or non-appearance of the former is governed solely by the nature of the lesion; but the latter is a terminal effect dependent only on the fact of the arrest, howsoever it be brought about.

A great deal of research work on intestinal obstruction has been carried out in the United States, and the experiments of Stone, Bernheim, and Whipple [4] on dogs may be referred to here. These workers isolated closed loops of intestine with the mesentery belonging to them at various levels, and restored the continuity of the intestine by suture. High closed loops caused rapid death with symptoms said to resemble acute volvulus, but with diarrhœa as well as vomiting. The lower the loop, the less violent were the symptoms, until loops made from the large intestine were not incompatible with life. The symptoms did not appear if the loop was enterostomosed at the time it was made, and subsided on subsequent enterostomy of the loop or its complete removal, if performed before the animal was too ill to recover. A toxin whose origin was ascribed to biochemical processes in the mucosa was shown to

[4] Stone, Bernheim, and Whipple: Jour. Exp. Med., 1913, xvii., 286, 306, 323, and 1914, xix., 144, 160, 180; and Bull. Johns Hopkins Hosp., 1912, xxiii., 159, 165.

be present in the loop contents, for these intravenously injected into a second animal caused the same effects. These results which in the main have been confirmed by other workers must be applied to human beings with caution, but the condition of the experimental closed loop is in some respects analogous to what obtains in Meckel's diverticulum when it undergoes strangulation. It might therefore be inferred that the agent, which, transmitted from the diverticulum to the continuity of the intestine induces in it functional obstruction, is formed in the diverticular mucosa as the result of the arrested flow, in the same way and for the same reason as the loop toxin is said to be formed in the experiments described. The inference, however, is shown to be untenable in view of what happens in strangulation of a partial hernia, for here the appearance of the agent must precede and be the cause of the arrested flow.

The foregoing considerations lead us up to those cases in which the syndrome of obstruction develops in the absence of any lesion in the intestine, and in which, therefore, the agent causing the motor and vasomotor disturbances that characterise functional obstruction must be generated elsewhere. In many of these patients nothing amiss is discoverable on reopening the abdomen beyond the state of the intestine associated with the syndrome. In others a degree of plastic peritonitis is present in the operation area such as is not infrequently found when an abdominal wound is reopened for causes other than obstruction. Peritonitis even when general; local peritonitis, though advanced to the stage of a large collection of pus; and hæmorrhage in the operation area are only rarely associated with the obstruction syndrome, so that when the conjunction occurs it must be fortuitous; and though all of them give rise to distension it has no specific distribution as in obstruction.

A much more active promoter of intestinal derangement, terminating perhaps in obstruction, is the presence in the operative field of an area of tissue, whose blood-supply has been interfered with but not entirely cut off. This is significant in view of what I have already said; one of the most acute cases of functional obstruction I ever saw was caused by a suture which had by accident partially strangled the ovary. I am not personally conversant with the state of the operation area when severe distension or functional obstruction follows lumbar nephrectomy or prostatectomy, but I understand, from those who are, that nothing specific is discoverable. The only feature therefore common to all cases exhibiting post-operative functional derangement of the intestine, whatsoever its degree, is traumatised tissue in or in close relation to the peritoneal cavity, and somewhere in that tissue the agent producing the derangement must be generated. It is clear that the agent does not derive from retained intestinal matter or from the mucosa of the segment where the retention takes place, and that it is distinct from any toxic substance that may be produced in either of them; so that the good results of jejunostomy must be ascribed, not to the removal of the agent, but to the removal of the corrupt matter and harmful distension which the motor and vasomotor disturbances caused by the agent have brought about. In other words, the operation does not stop the production of the agent and its effects on the intestine, but abrogates the consequences that proceed from those effects.

Whether the agent is transported by the blood stream or spreads by lymphatic channels or via the peritoneal cavity; or, whether, remaining local in the area in which it is produced, it acts on the splanchnic nerves in that area, causing impulses which check the mobility of the intestine and disturb its blood-supply are speculative questions. All three are possible. If the agent acts through blood transportation the lesion generating it might presumably be situated at a distance very remote from the peritoneal cavity, whereas in fact it always lies in or in very close relation to it. There must therefore be something peculiar to the tissues in this situation, as compared with those elsewhere, and the most obvious difference between them is that the former contain splanchnic nerves whilst the latter do not. It may be that the agent can only be generated in tissue that contains splanchnic nerve substance, or it may be formed from that substance. By whatever means it becomes operative its effect seems, as a rule, to fall most powerfully on the stomach and upper intestine; and it is limited thereto in those remarkable cases of functional obstruction following a pelvic operation, in which, on reopening the abdomen, nothing amiss is apparent except intense congestion and distension of the jejunal coils. I have seen cases in which the stomach alone was affected. No explanation is apparent to account for the varying length of the intestine that the agent affects in different cases, nor for the occurrence, in a segment or segments, of spastic contraction. The relative immunity from intestinal derangement that attends opening the peritoneal cavity in certain ways would seem to be in some manner connected with the fact that in those incisions less cutaneous nerves, or none at all, are divided. It may be that injury to cutaneous nerves reflexly sensitises the sympathetic nerves connected with them.

It is not within the provinces of this paper to discuss the views of experimentalists as to the nature and source of the toxin present in the intestinal contents in cases of obstruction, nor the part it plays in the production of the hypochloræmia and alkalosis which accompany the fully developed syndrome. These phenomena are terminal, not basic.

Summary

Operations that open the peritoneal cavity, or without opening it, involve the tissues in juxtaposition to it, cause a derangement of the intestines characterised by general or regional cessation of intestinal movement, and a specific disturbance of the mesenteric circulation; and as a result of these the gas-balancing mechanism is upset and gaseous distension ensues. If these motor and vasomotor phenomena are marked and prolonged and the distension reaches a high grade, the venous return from the intestinal vessels suffers additional retardation owing to the stretching of the mesentery and the raised intraperitoneal pressure; the wall of the distended intestine becomes paralysed; and kinkage occurs at multiple points producing a series of mechanical obstructions. The greatly impeded flow through the mesenteric veins is followed by exudation into the lumen of the intestine, most marked in that section where the venous congestion is at its maximum, and the fluid exuded undergoes a corrupting change whereby it becomes toxic.

The events described are not specifically related to operative injury or exposure of the intestine, for they can occur after operations which do not open the peritoneal cavity; and this, together with the fact that the operation area is very commonly at a distance from the area in which the events take place, can only be explained by the hypothesis that the motor and vasomotor disturbances in the intestine, which are fundamental to the derangement, are caused by an agent generated somewhere in the tissues that the operation has traumatised. Such evidence as is

available suggests that its production has some relation to partial circulatory interference.

The problems I have tried to coördinate are very intricate and no one is more conscious than myself of the incompleteness of the result; but I chose the theme of this lecture in the hope of inciting more workers, in this country, to enter a field of clinical and experimental research from which knowledge, that will halve the risk and quarter the suffering that now attends abdominal operations, is waiting to be garnered.

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THE MEAN DIAMETER OF THE ERYTHROCYTES IN ACHOLURIC FAMILY JAUNDICE

AND THE EFFECTS OF SPLENECTOMY

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THE erythrocytes in acholuric family jaundice have been observed to have a diminished mean diameter, which is accompanied by an increase in the thickness; the mean cell volume is thus in proportion greater than the mean diameter.[1-4] Observations by Whitcher,[5] led him to the conclusion that diminished mean diameter disappears after splenectomy, and he added that this feature may be regarded as a concomitant manifestation of the anæmia of the disease rather than an inherent character of the erythrocytes of the individual. His method of estimating the mean diameter is described,[6] in which he measures 200 cells from each slide. If his observations were confirmed, the return to normal of the mean diameter after splenectomy would suggest that the abnormal size was secondary to some morbid process activated by the spleen.

In carrying out the investigations here recorded, the erythrocytes have been measured and the results calculated by the method described by Price-Jones.[6] In each case, complete clinical, pathological, and biochemical examinations were made synchronously; these results have been summarised elsewhere.[7]

The changes which take place in the erythron in acholuric family jaundice are, as a rule, typical and consist of lowering of the number of red cells and the hæmoglobin, usually in about equal proportions, a high degree of reticulocytosis, a positive indirect van den Bergh reaction, and an excessive excretion of urobilinogen and urobilin. Added to this in the large majority of cases are an increased fragility of the erythrocytes to hypotonic saline, and a diminution of the mean diameter (unaccompanied by similar change in mean corpuscular volume), together with increased variability. Cases are recorded in which increased fragility, diminished mean diameter, and reticulocytosis have individually been absent,[8] but the majority of cases (percentage figures are not available) present all the features mentioned. The present communication is concerned with such changes as have been observed by use of the Price-Jones curve, other points only being included for clarity where required.

The mean diameter and variability in untreated patients vary from case to case, and may also vary in the same patient from observation to observation. As a rule the steadiness of the curve reflects a similar steadiness of the balance between the increased destruction and production taking place in the erythron. A typical Price-Jones curve is shown in Fig. 1 which shows a mean diameter of 6·144 μ and a coefficient of variation of 10·35 per cent.; 40·4 per cent. of the cells are microcytes. The effect on the mean diameter of the changes in the erythron which occur in the course of the disease may well depend in part upon the fact, observed by others and ourselves, that the reticulocytes in this disease are of greater diameter than the mature erythrocytes. Thus, in a crisis due to temporary cessation of marrow activity, it would be expected that with the disappearance of reticulocytes the mean diameter would be lower than usual in the patient under investigation, and we have found this to be the case; similarly the fall in reticulocytes from the very high level that they may reach from time to time may be accompanied by a fall in mean diameter. The paradoxical reversion of the erythron to the production of megalocytes in rare cases has been claimed to occur; we have seen the Price-Jones curve of one case.[9] It is impossible to affirm that in all cases the characteristic features of increased fragility and reduced mean diameter are actually present at birth. If they are, and thus antedate the development of symptoms and signs of hæmolysis, it would be evidence against the hypothesis that the erythrocyte changes are but concomitant manifestations. We have observed a case[10] in which both increased fragility and diminished mean diameter were present from birth (or more accurately 36 hours of age) and in which no other symptoms developed for over a month.

The effect of blood transfusion on the Price-Jones curve would be expected to result in increase in the mean diameter from admixture of normal cells,

unless the morbid action of the spleen, or some other mechanism within the recipient, was responsible for causing by its action the altered shape of the red cells. The mean diameter may be shown

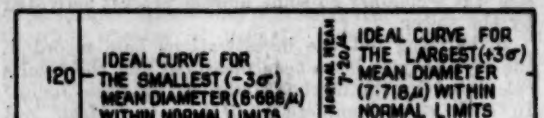
IDEAL CURVE FOR THE SMALLEST (-3σ) MEAN DIAMETER (6·688μ) WITHIN NORMAL LIMITS
NORMAL MEAN 7·20μ
IDEAL CURVE FOR THE LARGEST (+3σ) MEAN DIAMETER (7·718μ) WITHIN NORMAL LIMITS
MEGALOCYTOSIS 0%
MICROCYTOSIS 40·4%
M.D. 6·1440μ
σ 0·83582μ
v 10·349%
No OF RED CELLS
DIAMETER μ

FIG. 1.—Typical Price-Jones curve in untreated acholuric family jaundice.

definitely to be raised after a transfusion, the phenomenon being still evident 24 hours later and disappearing gradually.

We have observed four cases from their admission to hospital for periods up to eighteen months following splenectomy. In no case has the Price-Jones curve returned to normal. In all there was a quick response in the form of a raising of the mean diameter, which approached normal, and in some cases then tended to recede again so that it ultimately found a level (not constant) on the low side of normal, different cases varying in the amount by which they were separated from normal. The increase in mean diameter is at first rapid and can be observed within three days (Fig. 2); it becomes more gradual; one case actually reached normal mean diameter before falling again. The subsequent slight fall, noticed in two of the four cases, was not associated with any apparent change in the blood count or clinical condition.

The coefficient of variation also moves towards normal, but more slowly, and may show increase again after coming within normal limits; the striking thing about it however is that this shift towards normal is very slow, and is but little apparent at a time when the red cell count and hæmoglobin have returned to their normal level. Thus in these cases the anisocytosis is not apparently related to the presence of immature cells in the same way that it may be in other anæmias, but to some unknown abnormality.

OTHER ANÆMIAS SHOWING DIMINISHED MEAN DIAMETER

According to Witts,[11] in acquired acholuric jaundice with no family history, the cells do not show similar changes but may be slightly larger than normal. We have found that they may on occasion be identical with the familial type of curve. It is probable that acquired chronic hæmolytic anæmia is ripe for a further subdivision into types. In acute hæmolytic anæmia (Lederer's anæmia) the diameter is sometimes diminished and sometimes increased (Witts[11]); our examples of this anæmia with diminished mean diameter have shown return to normal with recovery.

Diminished mean diameter is commonly seen in anæmia due to iron deficiency both in adults[12] and in infants[13]; in these cases however there is reduction in cell-volume.[4] Return to normal occurs with treatment by iron, the actual recovery process being accompanied by increased variability. A similar phenomenon has been observed in anæmia due to copper deficiency,[14] and we have also observed it in anæmia accompanying scurvy. Diminished mean diameter, it is said, also accompanies anæmia due to hæmorrhage, and polycythæmia[9]; there is no evidence of its occurrence in splenic anæmia. Abnormal falls in mean diameter are observed in the later stages of icterus gravis[15] and to a lesser extent in the blood of premature babies during the first few months of life.[16]

DISCUSSION

Were the spleen the cause of the described abnormalities in the erythrocyte, the mean diameter should return to normal after splenectomy; if on the other hand the cells were abnormal in shape entirely because of an inherited abnormality of the erythron, then the splenectomy should have no effect. It is obvious that the partial but not complete return to normal indicates something more complex. The spleen is, it would appear, causing a further distortion of an already abnormal cell, and splenectomy thus causes partial return to normal, the degree depending on a balance of the two factors. It must also be remembered that the rest of the reticulo-endothelial system, in assuming certain functions of the removed spleen, may assert fresh influences on the erythrocytes. But it is possible that further mechanisms come into play; a prolonged hæmolytic process is suggested as a possible cause for a fall in mean diameter in both premature infants[16] and in icterus gravis,[15] and this may have a bearing on the present argument. The removal of the spleen might cause an increase in mean diameter in other diseases besides acholuric family jaundice, and even in the healthy person, but no adequate information is at present available on this point. The fact that the mean diameter may be diminished also in the other blood diseases mentioned adds to the possible number

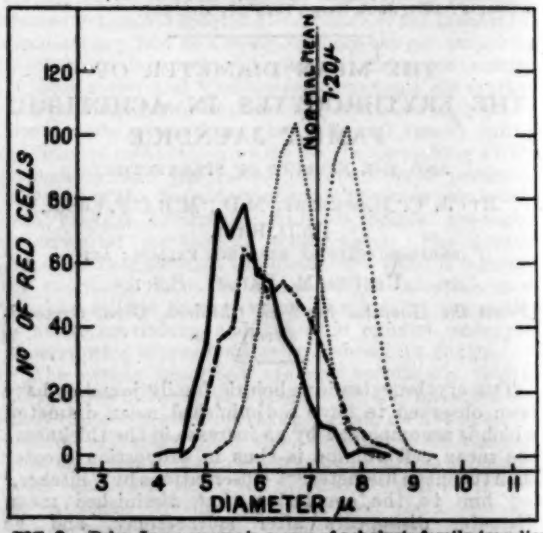

FIG. 2.—Price-Jones curves in a case of acholuric family jaundice before splenectomy (continuous line) and three days after (interrupted line). The actual values are as follows. Before splenectomy: M.D. = 5·960μ; σ = 0·65841μ; v = 11·0473%; microcytosis, 50·2%. After splenectomy: M.D. = 6·335μ; σ = 0·76261μ; v = 12·03803%; microcytosis, 31·4%.

of causes which may be at work. One fact emerges—namely, that neither the spleen nor the mechanism producing the red cells is alone responsible for this phenomenon, which must be due to a complex combination of circumstances.

SUMMARY

In cases of acholuric jaundice the following observations have been recorded. (1) Blood transfusion raises the mean erythrocyte diameter. (2) Fluctuations in mean diameter may in part be dependent on the number of immature red cells present, apart from the influences of splenectomy and transfusion. (3) In a new-born infant, diminution of mean diameter and increased erythrocyte fragility preceded the development of any other evidence of the disease. (4) In four cases where splenectomy was performed there was a move towards normal of the mean diameter, followed in two cases by a partial swing back. Variability gradually decreases, and is not related to recovery of the blood count which occurs quickly. (5) Mention is made of other anæmias in which the mean diameter is diminished. (6) The possible significance of these findings is discussed.

We gratefully thank Dr. C. Price-Jones for his most helpful advice in the application of his methods, the medical staffs of the Hospital for Sick Children and University College Hospital for allowing us access to their cases, Dr. D. N. Nabarro as director of the pathological department, and the Medical Research Council for an expenses grant.

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THE PERIODICITY OF INFLUENZA

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A KNOWLEDGE of the periodicity of an epidemic disease is of practical value to those concerned in hospital administration, since it enables provision to be made to forestall the disorganisation resulting from an otherwise unforeseen and perhaps sudden increase in the number of patients. This is particularly true of influenza epidemics, as they are most frequent during winter, when sickness is at the maximum. There is also reason to believe that some clue to the cause of influenza epidemics may possibly be found in the features of their periodicity.

The material used for discussion here is that afforded by the "Weekly Return" of the Registrar-General for the past 44 years, from which it appears that during this period there have been 43 prevalences or epidemics in London, of widely differing degrees of severity. The accompanying Table of these prevalences shows the year of occurrence, the week in that year in which the maximum mortality was reached, the number of deaths in that week, and the interval in weeks to the next following epidemic.

Prevalences of Influenza in London 1890–1933

Year.	Week of max. preval.	Deaths in max. week.	Interval in weeks to next preval.	Year.	Week of max. preval.	Deaths in max. week.	Interval in weeks to next preval.
1890*	3	127	70	1913*	12	65	46
1891	20	319	36	1914	5	32	55
1892	3	506	63	1915	8	83	61
1893	14	49	36	1916	17	41	35
1893	50	164	64	1916	52	98	80
1894	—	—	—	1917	—	—	—
1895	10	473	111	1918	28	287	16
1896*	—	—	—	1918	44	2458	17
1897	16	37	41	1919*	9	808	56
1898	5	102	58	1920	12	131	55
1899	11	125	43	1921	15	49	39
1900	2	340	60	1922	2	551	64
1901	10	39	50	1923	14	56	45
1902*	8	107	48	1924*	7	178	52
1903	3	43	59	1925	6	92	60
1904	10	24	49	1926	14	74	42
1905	7	40	61	1927	4	252	57
1906	16	43	37	1928	9	21	51
1907	1	87	60	1929	8	473	103
1908*	9	141	56	1930*	—	—	—
1909	12	138	46	1931	6	116	48
1910	6	45	54	1932	2	145	54
1911	8	24	52	1933	4	370	—
1912	8	35	58				

* In these years there were 53 registration weeks.

The only practical way of timing these epidemics is by the week of maximum mortality, and it is found that as thus timed they are most frequent in the eighth, ninth, and tenth weeks of the year—i.e., about the beginning of March. The seasonal distribution of the 43 prevalences will be seen in Fig. 1. The 52 sectors of the circle represent the 52 weeks of the registration year; the dots against them indicate the number of times a prevalence has attained a maximum mortality in the respective weeks during the 44 years.

It should be borne in mind in considering this graph that the timing of an epidemic by the week of maximum mortality is only an approximate means of assigning its seasonal position. The interval between the first cases of an oncoming epidemic and the week of maximum *deaths* varies from one prevalence to another, and is probably on the average not less than seven weeks. The winter solstice—Dec. 22nd—falls generally in the fifty-first registration week. The lowest mean temperature is generally two or three weeks later than the astronomical mid-winter: if, therefore, the influenza prevalences were entirely dependent upon temperature conditions there would be an average interval of about nine weeks between the winter solstice and the week in which epidemics are most frequent, which, as Fig. 1 shows, is about the ninth week. There is no special reason for thinking that temperature is a factor at all in seasonal distribution: it is merely suggested that the lag of the period of greatest frequency upon the time of the winter solstice is consistent with a dependency directly or indirectly upon *some* climatological condition.

On this assumption epidemics which are located in the graph between the tenth and thirty-fifth weeks of the year can be regarded as governed by the condition of approaching summer, and for convenience of reference these are designated Group I. epidemics; on the other hand, epidemics allocated to the weeks between the thirty-fifth week and the eighth week of the following year may be regarded as subject to

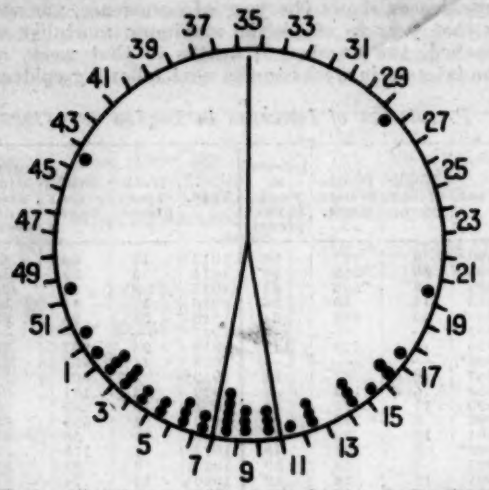

FIG. 1.—All influenza epidemics in London during the past 44 years. The black dots are placed opposite the week of the year in which the various epidemics reached their maximum mortality.

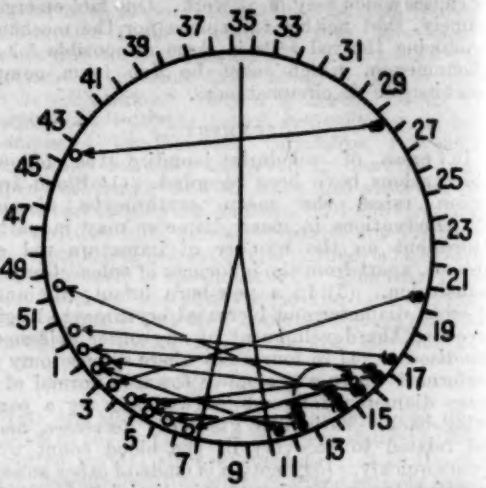

FIG. 2.—Epidemics of Group I. (right-hand side) and on left the epidemics immediately following them (paired epidemics).

the condition of approaching winter and are classed as Group II. epidemics. In addition there are the epidemics allocated to the eighth to tenth weeks of the year, which cannot be classed definitely to one or other of these two groups owing to the known inaccuracy of the available means of timing the epidemics, and these form the residual Group III.

The epidemics of Group I.—The peculiarity of the epidemics of this group is that with one exception—namely, a prevalence in 1920—each is paired with another *immediately following it*, the members of each pair being approximately equidistant from the thirty-fifth week of the year. The incidence of the Group I. epidemics is shown in Fig. 2 by black dots on the right-hand side of the circle. The epidemics immediately following them, with which they are paired, are shown on the left-hand side by small circles, each pair being joined by an arrow.

So far, therefore, as the epidemics of Group I. are concerned the facts may be stated as follows:—

Where an epidemic originates during the six months influenced by the approach of summer (i) it will be followed by another epidemic in the succeeding six months; and (ii) the two epidemics will be approximately equidistant from the thirty-fifth week of the year.

The average time elapsing between the paired epidemics is somewhat less than 41 weeks: hence an assumption of an *annual* periodicity would, if applied to the first epidemic of each pair, result in an average error of about two and a half months in the forecast.

In the *epidemics of Group II.* there is a complete absence of any tendency to pair or balance (Fig. 3A); in fact, in only one of the 18 epidemics of this group is there any following prevalence in the succeeding six months—namely, that in the forty-fourth week of 1919. With this exception the average interval between each of the epidemics and that immediately following is about *60 weeks* (Fig. 3B). In respect of Group II. epidemics the rule therefore is:—

When an epidemic occurs during the six months preceding the winter solstice there will be no epidemic prevalence for, on the average, about *one year from the end of the six months.*

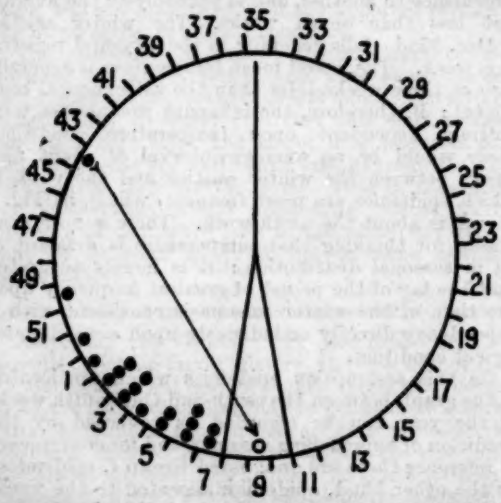

FIG. 3A.—Epidemics of Group II. (None "paired"—i.e., none of them is followed by another epidemic in the following half-year.)

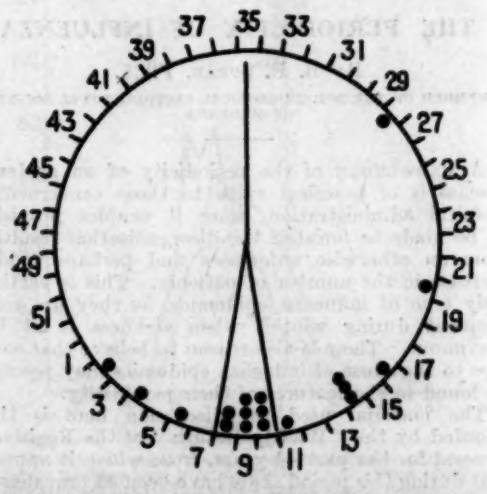

FIG. 3B.—Epidemics of Group II. Distribution of epidemics immediately following those shown in Fig. 3A. On an average these are 60 weeks later than those in 3A.

With regard to the residual epidemics forming Group III. attaining a maximum during the eighth to tenth weeks of the year, there are two—namely, one with a maximum in the tenth week of 1895, and the other with a maximum in the eighth week of 1929—which were followed by *two* years of non-prevalence. In the remaining 11 instances the interval to the next following epidemic was on the average *about one year*.

In the present year, in the course of a relatively small-prevalence, the mortality reached a maximum in the eleventh week. This indicates a prevalence beginning towards the end of the year and reaching a maximum about the middle of February. Reference to the table given above shows that the epidemics tend to alternate in severity as for instance in the years 1892–95 and 1920–24, but they are apt to "break step." It is, however, not improbable, in view of the mildness of the last prevalence, that we may now expect one of some severity.

CONCLUSIONS

The conclusions to which this analysis of the London epidemics point are that (i) the conditions associated with the approach of summer exercise a restraining influence upon an established prevalence of influenza, but that (ii) on the return towards the winter solstice the prevalence is renewed—generally with greater mortality—at a seasonal phase approximately the same as that at which the first prevalence occurred, and that (iii) in the case of a prevalence associated with an approaching winter solstice the *epidemic impulse is completely exhausted* and a year or more of freedom from epidemic prevalence follows.

Rules are given which enable an approximate forecast of a prevalence to be made.

THE MANTOUX TEST IN A GENERAL HOSPITAL POPULATION

With a note on the

INTRADERMAL SYRINGE OF PICTET

BY G. GREGORY KAYNE, M.D., M.R.C.P. Lond.

DOROTHY TEMPLE CROSS RESEARCH FELLOW IN TUBERCULOSIS

IN view of the increasing use of the intracutaneous tuberculin (Mantoux) test in clinical medicine, the results obtained in the following investigation carried out (in 1933) under routine hospital conditions may be considered of practical interest.

It was undertaken at St. Charles' Hospital, a London County Council general hospital admitting patients chiefly from the North Kensington district. A large number of the patients are of the "chronic" medical type. All ages are represented (Table I.), but there is a preponderating proportion of people over 45, and particularly over 60. The ratio of males to females was 10:9. Each patient was explained the nature of the test beforehand and in the case of children the parents were interviewed. Six patients only refused to have the test carried out. A total of 454 patients were thus tested, consisting of 57 clinically tuberculous (of which 9 non-pulmonary) and 397 clinically non-tuberculous. The diagnosis accepted in each case was that made by the medical officer in charge, and no additional investigations were carried out to exclude tuberculosis, in surgical cases for example, when the history and symptoms did not suggest its presence.

TECHNIQUE OF INVESTIGATION

Burroughs and Wellcome's Old Tuberculin Human (T), Series T 1586 was used. Dilutions were made with sterile distilled water and 0·5 per cent. phenol, and only those which had been prepared not more than ten days previously were employed. A hypodermic syringe of the "insulin pattern" graduated in twentieths of a cubic centimetre was used. The special short-bevelled intradermal needles employed at first were discarded because they blunted very quickly as the result of "flaming" between tests. Very fine *sharp* hypodermic needles were found to give equally satisfactory results, but more care had to be taken in inserting the needle. Each test was carried out by rubbing the forearm with ether and injecting intradermally 0·1 c.cm. of the appropriate dilution. If any doubt was felt as to whether the whole of the dose had been given intradermally the injection was repeated on another part of the forearm.

Each patient was first tested with a dilution of 1 in 10,000 on the left forearm. This was read after 48 hours. If negative or doubtful the test was repeated on the same day with a dilution of 1 in 1000 on the right forearm. When this second test was read 48 hours later the left arm was also examined to see if a delayed positive reaction had appeared with the 1 in 10,000 dilution. After doubtful or negative readings with the 1 in 1000 dilution, a third test was performed the same day with a 1 in 100 dilution lower down on the right forearm. When the last was read 48 hours later the previous test area was also examined for a delayed positive reaction. Doubtful and negative reactions with 1 in 100 were again inspected two days later. In a few patients the test with the stronger dilution was not performed at the time of the first reading of the weaker dilution, but was postponed two or three days. Hence a certain number of patients with a delayed positive reaction did not have the test repeated with the next stronger dilution.

The minimum admitted as a positive reaction was a well-defined erythematous area 10 mm. in diameter and slightly raised (as indicated by touch) above the surrounding surface.

Table IV. shows that quite an appreciable proportion of the tests gave rise to some difficulty in reading (doubtful readings), 15 per cent., 10 per cent., and 7 per cent. for dilutions 1 in 10,000, 1 in 1000, and 1 in 100 respectively. It may be added that Opie and McPhedran [1] in their investigation took an area of redness 10 mm. in diameter as indicating a positive reaction, and state that "inconspicuous spots of redness, or redness with no œdema, have not been regarded as definite evidence of hypersensitiveness to tuberculin." Hart,[2] on the other hand, states that "a reaction should be regarded as positive if it consists of an area of erythema or erythematous infiltration the greatest diameter of which equals or exceeds 5 mm." Cummins and Walker [4] even considered "no reaction measuring less than 2 mm. across can be accepted as definite."

RESULTS

The number of patients tested and the readings obtained after 48 hours with the three dilutions according to age-groups are indicated in Table I. (clinically non-tuberculous patients).

Table II. gives the number and percentage of positive reactions for the different dilutions, after allowing for delayed positive reactions and after correction for positive readings obtained with the next stronger dilution used before the delayed positive reaction had appeared. It will be noted that in each age-group (from 15 years upwards) 28 per cent. to 39 per cent. are positive with 1 in 10,000, 35 per cent. to 48 per cent. more with 1 in 1000, and 0 to 19 per cent. more are positive with 1 in 100. Grouping together all patients from the age of 15 upwards, we find that 35 per cent. are positive with 1 in 10,000, 74 per cent. after the test with 1 in 1000, and 86 per cent. after 1 in 100; and finally, that 14 per cent. remain negative even with the strongest dilution. Hart's[3] corresponding percentages were 63, 88, 93, and 7.

His age-grouping was, however, different, and his figures here given are for 134 patients from the age of 21 upwards (as against 346 from 15 upwards). Moreover, the present series probably contains a far larger proportion of patients over 60, in whom reactions might possibly be expected to be feebler or absent as the result of general debility or alteration of the texture of the skin. Thus in the age-group 30–34 the respective percentages correspond more closely

TABLE I.—*Clinically Non-tuberculous Patients*
Number tested and readings obtained at 48 hours with each dilution

Age-group.	1 in 10,000.				1 in 1000.				1 in 100.			
	Tested.	+	?	–	Tested.	+	?	–	Tested.	+	?	–
0–14	51	10	6	35	41	10	5	26	31	6	2	23
15–29	64	20	6	38	42	31	1	10	11	0	1	10
30–44	57	19	7	31	38	25	2	11	12	8	0	4
45–59	78	22	17	39	56	27	7	22	28	16	1	11
60 and over.	147	50	26	71	96	48	13	35	45	22	5	18
Total .	397	121	62	214	273	141	28	104	127	52	9	66

to Hart's—39, 83, 93, and 7. The difference is most marked with the dilution of 1 in 10,000, and it should be pointed out that in Hart's investigation not all the patients were tested with this dilution, but only "individuals selected at random."

TABLE II.—*Clinically Non-tuberculous Patients*
Positive reactions with each dilution and negative reactions with 1 in 100 (after correction for delayed positive reactions—see text)

Age-group.	Patients tested.	1 in 10,000.	1 in 1000.	1 in 100.	Negative.
		Number and per cent.			
0–14 ..	51	13 (25)	8 (16)	5 (10)	25 (49)
15–29 ..	64	22 (34)	31 (48)	0 (0)	11 (17)
30–44 ..	57	22 (39)	25 (44)	6 (10)	4 (7)
45–59 ..	78	22 (28)	29 (37)	15 (19)	12 (15)
60 and over ..	147	54 (37)	51 (35)	21 (14)	21 (14)
Total ..	397	133 (34)	144 (36)	47 (12)	73 (18)
15 and over (i.e., excluding children) ..	346	120 (35)	136 (39)	42 (12)	48 (14)

Table III. gives the results obtained in the clinically tuberculous cases: 43, or 75 per cent., reacted positively with 1 in 10,000, 53, or 93 per cent., after 1 in 1000, and all were positive after the 1 in 100 test. While the numbers tested are small, nevertheless the results appear to support the hypothesis (also supported by Hart's results) that "the weaker the solution of tuberculin to which a patient will react positively, the more likely he is to be suffering from clinical tuberculosis rather than from subliminal tuberculous infection."

In Table IV. the doubtful reactions are analysed further. It will be noted that for both the 1 in 10,000 and 1 in 1000 dilutions roughly two-thirds of the doubtful reactions become positive either after 96 hours or with the next stronger dilution, but that over one-third of them were *not* positive with the next stronger dilution. The above prompts the conclusion that whenever in any doubt at all as to the reading, a further test with a stronger dilution should be carried out.

TABLE III.—*Clinically Tuberculous Patients*

Dilution.	Pulmonary Cases (48).					Non-Pulmonary Cases (9).				
	Tested.	+	?	–	No. + (corrected)	Tested.	+	?	–	No. + (corrected)
1 in 10,000	48	37	4 (1 + later)	7	38	9	4	1 (1 + later)	4	5
1 in 1000	11	8	2	1	7	5	4	0	1	3
1 in 100	3	3	0	0	3	1	0	0	0	1

Table V. shows the number of doubtful and negative reactions (at 48 hours), which became positive after 96 hours—6 per cent. and 9·5 per cent. for dilutions 1 in 10,000 and 1 in 1000 respectively. But 19 out of 106 or 18 per cent. of the total number of doubt-

TABLE IV.—*Doubtful Reactions (All Patients)*

Dilution.	Total readings.	Doubtful reactions. Number and per cent.	Became + later. (a)	Became + with next stronger dilution. (b)	(a) + (b). Number and per cent.	Were – with next stronger dilution. Number and per cent.
1 in 10,000	454	67 (15)	14	30	44 (65)	23 (35)
1 in 1000	289	30 (10)	4	13	17 (57)	13 (43)
1 in 100..	131	9 (7)	1	..	..	..
Total .	874	106 (12)	19	..	..	..

reactions became positive, while only 14 out of 397 or 3·5 per cent. of the total negative readings became positive. It would appear, therefore, that it is worth while to postpone retesting with a stronger dilution whenever a doubtful reaction is obtained until the test has been read again after 96 hours.

TABLE V.—*Doubtful and Negative Reactions at 48 Hours, becoming Positive after 96 Hours (All Patients)*

Dilution.	1 in 10,000.	1 in 1000.	1 in 100.	Total.
Total doubtful and negative readings ..	292	136	75	503
Doubtful became +..	14	4	1	19
Negative became +..	4	9	1	14
Total number and per cent.	18 (6)	13 (9·5)	2 (2·6)	33 (6·5)

SUMMARY AND CONCLUSIONS

1. A total of 397 clinically non-tuberculous and 57 clinically tuberculous patients representing a general hospital population were examined with the intracutaneous tuberculin test using dilutions of 1 in 10,000, 1 in 1000, and 1 in 100.

2. Of the 346 clinically non-tuberculous patients from the age of 15 upwards, 35 per cent. were positive after the 1 in 10,000 test, 74 per cent. after the 1 in 1000, and 86 per cent. after the 1 in 100; 14 per cent. were thus found negative even with the last dilution.

3. Assuming a well-defined raised area of erythema 10 mm. in diameter as the lowest limit of a positive reaction, 12 per cent. of all the readings at 48 hours were doubtful. About two-thirds of these became positive either at 96 hours or with the next stronger dilution, one-third being negative with the next stronger dilution.

4. It appears therefore advisable to regard a raised erythematous area at least 10 mm. in diameter as the lowest limit of a positive reaction (rather than merely an erythematous area 5 mm. in diameter) and to consider any less well-defined reaction as doubtful.

5. Eighteen per cent. of doubtful and 3·5 per cent. of negative reactions at 48 hours became positive at 96 hours.

6. It is suggested that whenever possible a patient should first be tested with a dilution of 1 in 10,000 (four patients clinically non-tuberculous in this series presented severe local reactions) and the reading taken at 48 hours. If negative the test should be repeated with the dilution of 1 in 1000 the same day, but if doubtful this should be postponed until a further reading has been made at 96 hours. A similar procedure should be adopted after the test with 1 in 1000 dilution. After the 1 in 100 test all doubtful *and* negative reactions should be read again after 96 hours.

I should like to express my gratitude to Dr. W. J. Fenton for his encouragement during the course of this investigation. I have also to thank Sir Frederick Kay Menzies and Dr. Basil Hood and the assistant medical officers at St. Charles' Hospital for permission to perform the tests on the patients not under my own care.

The Intradermal Syringe of Pictet

It is generally admitted that an intradermal injection requires a certain amount of dexterity and experience. Particularly is it important to carry out this apparently simple operation satisfactorily when it concerns the Mantoux test, for it is essential that the *whole* of the dose of tuberculin be injected *intra*dermally. For an occasional test in an older child or adult the use of an ordinary hypodermic syringe and a fine needle for this purpose offers no great difficulty. When, however, one is dealing with an infant whose arm is very small, whom it may be difficult to keep still, and whose skin often presents considerable resistance to the injection of even 0·1 c.cm. of fluid, the choice of instrument employed assumes great importance, especially when, for purposes of research, many infants have to be tested at one sitting.

Since the investigation above described was made I have had occasion to use a syringe specially designed by Dr. M. Pictet, directrice of the Œuvre du Placement Familial des Tout-Petits, in carrying out a series of Mantoux tests on infants. The simplification of the operation by the use of the latter instrument is so striking that I feel that its existence should be more widely known.

The syringe, a sketch of which is shown in the accompanying Figure, consists, like an ordinary hypodermic syringe, of a glass barrel and a piston. The latter carries a little disc B, which has a notch C on its edge, and a collar D with a little hole into which a screw E on the head of the barrel can be screwed in.

The syringe can hold a little over 2 c.cm. of fluid and is graduated in tenths of a cubic centimetre. It is separated in its two parts by unscrewing at F and can be boiled, or sterilised by immersion in alcohol. To fill it, the disc B is screwed up to the piston head A. The syringe can then be filled and emptied in the ordinary way by drawing up or pushing down A. Having filled it, B is screwed down to F, turned so that the notch C is against the screw E, when the latter is screwed down into the little hole of collar D. This fixes the piston so that it can no longer be moved up or down. To eject fluid from the syringe A is turned in a clockwise direction, a complete turn being equivalent to 0·1 c.cm.; A is therefore turned to empty

The intradermal syringe of Pictet.

the syringe of air and the needle inserted in the skin; by carrying out a complete turn—two equal movements are essential, it is too awkward for one movement—0·1 c.cm. of the tuberculin solution is injected into the skin.

The use of the syringe is simple and rapid, and the fluid is injected with great facility, presumably because of the greater mechanical "advantage" of the turning movement. Moreover, it is much easier to gauge the dose injected by appreciating the turn of the piston head, than by gazing down at the graduated marks of a barrel.

The syringe also has a flat rectangular metal disc G fixed to the end of the barrel. Applied against the infant's arm with the operator's left hand, it is very useful in immobilising the syringe in the case of a struggling infant.

The syringe, the cost of which in France is 90 francs (about 24*s*. at the present rate of exchange), is manufactured by Messrs. P. Gentile and Co., 49, rue St. André-des-Arts, Paris 6°, to whom I am indebted for the loan of the sketch.

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SOME OBSERVATIONS ON THE TREATMENT OF TABES WITH MALARIA

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The well-established therapeutic value of malaria in the treatment of general paralysis naturally suggests its use in other neurosyphilitic conditions, especially tabes. It has been tried by a large number of observers and the general consensus of opinion, both in this country and abroad, is that whilst it is definitely useful, it is less so than in general paralysis. The following observations are based on 32 cases of tabes treated with inoculated malaria which have been followed up for periods ranging from two to five years, and in order to establish a rough comparison 24 cases treated with arsenic, bismuth, and mercury have been followed up in addition.

It is notoriously difficult to estimate justly the effects of treatment in any disease, and especially in a disease like this which may become arrested as a result of natural processes. The method adopted—which at any rate has the advantage of being more practical, if less scientific, than other methods—was to base the judgment upon subjective symptoms.

To determine the results of treatment the following questionnaire was sent out :—

1. Have you had any further pain or rheumatism ?
2. Have you had any difficulty in walking ?
3. Have you had any trouble with the water ?
4. Have you had any stomach trouble ?
5. How is your eyesight ?
6. Have you had any other symptoms ?
7. Are you better than you were before treatment ?
8. Are you able to work ?

The answers received were compared with the symptoms originally complained of, and in many instances the patients were seen and examined on subsequent occasions. It was difficult to separate the results into various grades, such as marked improvement, slight improvement, &c., but it was comparatively easy and probably of greater practical value to divide them into two groups.

1. Good result—i.e., cases in which an improvement occurred which was definite and well worth while.

2. No result—i.e., cases in which no such useful improvement occurred. This group contained slight improvements, but of little practical value, stationary cases, and deteriorations.

Case illustrating Group 1.—A. B., aged 41. Twelve months' history, severe shooting pains, numbness, loss of weight, difficulty in micturition, occasional epigastric pain, great difficulty in walking, very ataxic, pupils inactive to light and unequal, knee- and ankle-jerks absent, W.R. ++ in blood and C.S.F. cells 48 per cm., colloidal gold 24444210000. Treated with malaria, 9 rigors. No other treatment. Two years later had a little pain for a year, none since. Has felt quite well since treatment. No difficulty with micturition, walks much better and can walk better in the dark. Can run and catch a tram and jump off when it is going. Reflexes unchanged. Much less ataxic. Gait almost normal. W.R. negative in blood and C.S.F.

Case illustrating Group 2.—C. D., aged 42. Three and a half years' history, severe shooting pains in legs and abdomen, marked ataxia, and occasional bladder symptoms. Pupils inactive to light, and knee- and ankle-jerks absent. W.R. ++ in blood and C.S.F. cells 67 per cm. Colloidal gold 22311000000. Malarialised, 10 rigors. Had a course of injections three years before, none since. Three years later, severe shooting pains, no improvement in walking, bladder symptoms still present, no better.

Having collected this information, and allocated the cases to their appropriate groups, a comparison was made between those treated with malaria and those treated with other methods. The following figures were obtained (Table I.) :—

TABLE I.—*Comparison with Other Methods*

Cases malarialised	.. .. ..	32	
No result	.. .. ..	21 = 65	per cent.
Good result	.. .. ..	11 = 34	,,
Cases not malarialised	.. ..	24	
No result	.. .. ..	11 = 45	,,
Good result	.. .. ..	14 = 54	,,

The good results were more numerous in the cases treated with other methods than in the malarialised cases, which confirms the view commonly held that malaria has not displaced the older methods in the treatment of this disease, but the fact that 11 out of 32 cases did show a decided improvement is in itself evidence that the method has real value, and especially so as in these 11 cases the results were strikingly good. With the exception of one which had a course of injections immediately before inoculation, and two others which had treatment some years earlier, these cases were treated with malaria only.

The symptoms in these cases were greatly improved and when they did persist were less severe. Many of the symptoms were notably improved within a few days of the treatment being stopped, and sometimes even whilst it was in progress. Pain and crises in particular usually increased in severity at first but rapidly subsided, and in most cases disappeared before the patient left hospital. After the treatment was concluded there was a general feeling of well-being, and they often volunteered the statement that they had not felt so well for years.

Malaria, moreover, has a distinct action in modifying the condition of the cerebro-spinal fluid. Table II. gives the average figures for the cells and albumin in 24 cases before and after treatment. The colloidal gold curve was usually improved and sometimes rendered normal. In most instances the Wassermann reaction was not altered, but in 2 cases it became normal.

TABLE II.—*Effect of Malaria on C.S.F.*

Twenty-four cases in which cells and albumin were estimated before treatment, and on discharge from hospital.

Cells	
Average before treatment	43
Average after treatment	5
Albumin	
Average before treatment	0·06
Average after treatment	0·034

It is evident that we have in malaria a method of treatment which does in some cases materially modify both the symptoms and the condition of the C.S.F. and that it is at least a valuable adjunct to other methods.

The great variations in the results of treatment whether by malaria or other means suggested an attempt to find out whether there was any factor in the clinical character of the cases themselves which determined the capacity to respond to treatment. The first point investigated was the duration of the neurological symptoms when the patient first came under observation (Table III.) :—

TABLE III.—*Duration of Neurological Symptoms*

Cases malarialised		
No result.	Average duration ..	4 yrs. 11 mths.
Good result.	,, ,, ...	2 ,, 8 ,,
Cases not malarialised		
No result.	Average duration ..	6 yrs.
Good result.	,, ,, ...	1 yr. 3 mths.

This shows clearly that whichever treatment was adopted a short duration favoured a good result. This, of course, is exactly what we should expect, for it is axiomatic that the earlier treatment is begun the better the result is likely to be.

The next point investigated (Table IV.) was the cell count of the cerebro-spinal fluid when treatment was commenced.

TABLE IV.—*Cell Count of Cerebro-spinal Fluid*

Cases malarialised		
No result.	Average cell count	23·3
Good result.	,, ,, ,, ...	68
Cases not malarialised		
No result.	Average cell count	11
Good result.	,, ,, ,, ...	34

This suggests very strongly that a high cell count favours a good prognosis. Finding then that a high

cell count and short duration favoured a good response to treatment, all the cases however treated were divided into two groups, with an arbitrary dividing line between them, as follows (Table V.) :—

TABLE V.—*Effect of Cell Count and Duration*

1. *Cases of under five years' duration and 30 cells or over in the C.S.F.*

15 cases..	..	No result	5
		Good result	10

2. *Cases of over five years' duration and under 30 cells in the C.S.F.*

14 cases..	..	No result	11
		Good result	3

This suggests that a short duration combined with a high cell count favours a good response, whilst the reverse favours a poor one.

The next point investigated (Table VI.) was the albumin content of the cerebro-spinal fluid.

TABLE VI.—*Albumin Content of C.S.F.*

Cases malarialised

No result.	Average albumin in C.S.F.	0·05
Good result.		0·07

Cases not malarialised

No result.	Average albumin in C.S.F.	0·03
Good result.		0·05

The differences here are not so striking, but the figures indicate that whichever method of treatment is adopted the successful cases showed a higher content than the unsuccessful ones, and that this is another factor favouring a good response. As there appeared to be in this series of cases three factors all favouring a good prognosis, the cases presenting all three factors in combination were picked out, adopting an arbitrary dividing line as before—i.e., all the cases were picked out which had a duration of five years or under, a cell count of 30 or over, and an albumin content of 0·08 or over. There were only six which satisfied all three conditions, but the result was good in every case.

These facts suggest some reflections on the pathology of tabes. The old description was that it was due to degeneration of the posterior columns. Then it was discovered that it was only the exogenous fibres arising from cells in the posterior root ganglia that degenerated, and much has been written about the exact place where the process starts. Tabes, however, like most diseases, is not a static entity, but a process. The beginnings go far back long before the appearance of any neurological symptoms. Sometimes in the secondary and tertiary stages of the original infections marked C.S.F. changes are found, and it is from these that the cases of neurosyphilis are subsequently recruited. Of these changes the Wassermann reaction indicates an active virus, and the leucocytosis certainly, and the increased albumin probably, are evidences of an inflammatory process. Tabes begins then as an inflammatory process, and for a time remains as such. Then gradually, degeneration begins, and the two processes overlap. The inflammatory changes gradually subside, and the degeneration gradually and surely increases. The tracts of the central nervous system once destroyed cannot regenerate, and therefore the degenerative phase of tabes is incurable. It is otherwise with the inflammatory phase, and it is in cases with marked inflammatory changes (high cell count and albumin content), and where the degenerative changes are early and of short duration, that treatment is likely to be effective.

Clinical and Laboratory Notes

FULL-TIME PREGNANCY IN A RUDIMENTARY HORN OF THE UTERUS

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ASSISTANT MEDICAL OFFICER AT THE HOSPITAL

THE following case may be found of interest both for its rarity and for the difficulty of diagnosis.

The patient was a primipara of 35, who had been married for five years. Her pregnancy had been uneventful and at no time had she suffered from abdominal pain. She was admitted to Hillingdon County Hospital on Feb. 23rd, 1934, being then three weeks overdue, with a history of having been in labour for two days. The fœtus had died

FIG. 1.—Radiogram taken after injection of lipiodol into the uterine cavity. The fœtal head is seen above and outside the uterus.

before admission. On admission her general condition was good and she was in no pain. Her pulse and temperature were normal, the blood pressure was 138/80 mm. Hg, and there was no albuminuria. The height of the fundus was consistent with a full-time pregnancy and the fœtal parts were not felt with undue ease. The head was deeply engaged in the left occipito-anterior position, no fœtal heart was heard, and the uterus was not contracting. On vaginal examination the cervix was not taken up, the external os admitted one finger, and the head was presenting. X ray photographs taken on the following day showed a full time fœtus, lying to the left side of the abdomen in an anterior position.

Before admission the pains had been weak, and as they did not return after a rest medical induction with quinine and castor oil was commenced. This having no effect, a surgical induction was performed four days later (Feb. 28th). During the operation it was found impossible to sweep the finger round the head because there seemed to be some tissue lying between the head and the examining

finger on the left side. A stomach-tube was inserted, but would only pass for about six inches. There was a crackling sensation over the left side of the uterus, resembling surgical emphysema.

On the following day the pains had not begun and the tube had fallen out. The external os was dilated to the size of half a crown. An attempt was made to hasten labour by rupturing the membranes but no membranes could be felt. A further course of medical induction was given. Two days later, without any pain or bleeding, a piece of greyish tissue was passed which resembled friable placental tissue. This unfortunately was not examined microscopically but was probably a cast of the uterine mucosa. On March 5th there was a slight brownish discharge from the vagina. The patient's general condition was still very good and no pains were present. The blood pressure was 126/82.

The following day, no progress being made, Mr. W. Gilliatt was called in consultation and diagnosed the condition as one of pregnancy in the rudimentary horn of a double uterus. He advised delay of operation for a month, provided sepsis did not occur, to allow the placenta to atrophy as far as possible. Confirmation of the diagnosis of an extra-uterine pregnancy was made by injecting lipiodol into the uterus, the outline of the slightly enlarged organ being shown clearly, quite separate from the fœtal head (Fig. 1).

Unfortunately sepsis set in and the patient's general condition began to deteriorate slowly. Abdominal pain

FIG. 2.—The uterus removed at operation. A, normal uterus laid open. B, incision through which fœtus was removed. C, portion of gestation sac.

was present, with increasing severity, and the temperature was swinging from 99° to 102° F. On March 15th the blood count showed a secondary anæmia of 2,500,000 with a leucocytosis of 13,000, mainly polymorphs, and the patient appeared to be so much worse that operation was no longer delayed.

A midline, subumbilical incision was made and what appeared to be a uterus presented. There was a band of tissue as thick as one's finger running from the left, across the front of the apparent uterus towards the midline, low down. It was decided to do the usual upper segment Cæsarean operation skirting it. This band of tissue proved afterwards to be the hypertrophied Fallopian tube of a normal sized non-parous uterus. A macerated full-time fœtus was delivered and the uterine muscle was found to be very friable indeed and not capable of contraction. An attempt was made to do a Cæsarean hysterectomy. As the operation progressed it was found that the posterior part of the uterine muscle was firmly fixed to the posterior abdominal wall behind and to the omentum and transverse colon above. By this time a circular part of the birth sac had been removed, when it was found that owing to the adhesions mentioned further progress was checked. An assistant put a finger into the vagina, which protruded into the sac from which the fœtus came, and one was at a loss to know what the condition actually was. A drain was pushed through the cervix into the vagina and another drain into the remains of the sac, and the abdomen closed.

On examining the piece of tissue removed it was found that a uterus of normal non-parous size had been removed, for the Cæsarean incision into the gestation sac (Fig. 2) had skirted the left side of the uterus and Fallopian tube, and that on the left side of the Cæsarean incision was a piece of the wall of a rudimentary horn. Therefore, what had happened was that a subtotal hysterectomy on a non-parous uterus had been done, and a piece of the wall of a rudimentary horn had been removed. No opening could be found leading from the cavity of the normal-sized uterus into the horn. The part of the horn wall that was left was in some places one inch thick. The patient stood the operation very well and was given a blood transfusion of one pint from a group III. donor.

FIG. 3.—Diagram showing the parts removed at operation.

Fig. 3 shows the parts removed at operation. The shaded part was left because of adhesions.

The patient made a slow but steady recovery.

We would like to express our thanks to Mr. Gilliatt for examining the patient and establishing the diagnosis.

ANEURYSMAL DILATATION OF THE PULMONARY ARTERY IN A CASE OF CONGENITAL HEART DISEASE

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DILATATION of the pulmonary artery can rarely be diagnosed clinically. In the following case a fairly complete investigation of physical signs, with an electrocardiographic picture, left little doubt that this was the condition present, and a post-mortem examination demonstrated the underlying congenital abnormalities which accounted for it. The literature of the subject has been adequately surveyed recently by D'Aunoy and von Haam,[1] who report the post-mortem findings in two cases, and also by Scott [2] in reporting the clinical and post-mortem evidence in another.

CASE RECORD

The patient, a married but nulliparous woman aged 37, was admitted to Selly Oak Hospital under my care on Feb. 27th, 1933. A congenital heart lesion had been recognised in early childhood, and some cyanosis and dyspnœa on exertion had been lifelong, but there had been increasing dyspnœa and œdema of legs and feet for the last three months.

CONDITION ON ADMISSION

A fairly well-built woman. Cyanosis marked, orthopnœa; some clubbing of fingers. The heart rhythm was regular except for occasional extrasystoles. Arteries not thickened; blood pressure 130/110. Considerable over-distension of veins of neck, and moderate congestive cardiac failure. The precordium bulged somewhat. The apex-beat lay in the fifth space 4 in. from the midclavicular line, while the area of cardiac dullness extended ¾ in. beyond the right border of the sternum. Palpation over the second and third left interspaces revealed an expansile pulsation, and systolic and diastolic thrills were palpable; dullness here extended 2½ in. to 3 in. from the midsternal line. There was a long apical systolic murmur, while near the left border of the sternum and maximal in the third

space a systolic murmur preceded a loud pulmonary second sound which was followed by a rough diastolic murmur. Examination revealed nothing else of note.

The blood Wassermann reaction was negative. Electrocardiogram: normal rhythm with high-grade right ventricular preponderance and frequent extrasystoles. Radiography: the transverse diameter of the heart greatly exceeds the normal; the apex is tilted and suggestive of right ventricular enlargement, while the right auricle is seen much enlarged. The pulmonary artery presents a well-defined semilunar prominence on the left border of the heart, while the dilated right branch is well seen. An oblique view with the barium-filled œsophagus does not indicate any great degree of left auricular enlargement. It is interesting to note too that the pulmonary notch of Bedford and Parkinson [3] is not discernible here, despite the known huge enlargement of the pulmonary artery.

COURSE OF ILLNESS

With rest and digitalis the congestive failure disappeared and the patient, despite a poor cardiac tolerance, was able to leave the hospital in 28 days. From this time until October, 1933, she remained free from severe symptoms, and attended the cardiac clinic. On Oct. 25th, however, she was readmitted to hospital with a history of having been unconscious for 24 hours. Examination showed the heart condition much as previously, while evidence of a right-sided cerebral thrombosis was present. Consciousness was not regained and she died within 48 hours.

POST-MORTEM FINDINGS

(Autopsy No. 342/33). Defect of interauricular septum (persistent ostium secundum); aneurysmal dilatation of the pulmonary artery; pulmonary incompetence; defect of the interventricular septum. Great enlargement of the right heart chambers. Slight coarctation of the aorta.

Viewed in situ the heart appeared greatly enlarged to right and left, the pulmonary artery formed an aneurysmal swelling above the left ventricle, and the right ventricle and auricle were much enlarged (Fig. 1).

The *pulmonary artery* and its branches are thickened, and there is slight intimal fatty atheroma. The pulmonary cusps are larger and thicker than the aortic cusps, and the orifice greatly dilated producing relative incompetence. The right branch is much dilated being larger than the descending aorta, while the left branch is only slightly smaller.

The *aorta* is relatively small, and just beyond the left subclavian there is a definite narrowing so that its lumen only just admits the little finger-tip. The right subclavian and the right carotid open directly into the aorta at the innominate orifice.

The *ductus arteriosus* is widely patent at its aortic end, but is conical, tapering rapidly so that its pulmonary orifice is only a narrow slit admitting the tip of the forceps with difficulty.

The *interauricular septum* shows three apertures, one large and two smaller ones. The largest aperture is oval, 3 × 2 cm., and is situated at the upper and posterior part

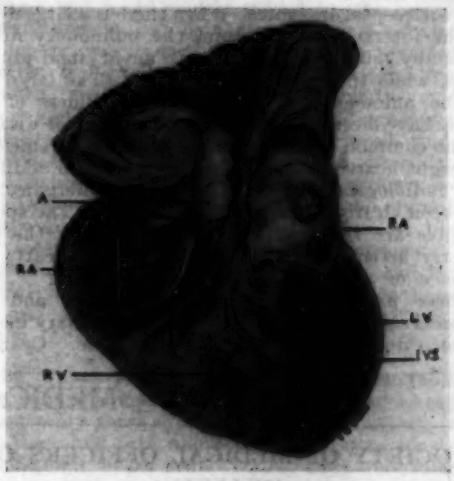

FIG. 1.—Anterior aspect of heart showing the contrast between dilated pulmonary artery (P.A.) and aorta (A.). L.V. = left ventricle; I.V.S. = interventricular septum; R.V. = right ventricle; and R.A. = right auricle.

of the septum, immediately in front of the orifice of the superior vena cava, from which it is separated by a strong muscular cushion; there is a small perforation in its anterior and lower margin. The two smaller apertures are situated below the larger one, and midway between it and the inferior vena caval orifice, and just above the Eustachian valve. The larger orifice is oval, 1 cm. in long diameter, the smaller 0·3 cm. The condition corresponds to Abbott and Kaufmann's case,[4] and represents a huge persistent ostium secundum. The venous openings are normal (Fig. 2).

The *interventricular septum* is imperfect at the base, and there is an aperture 2 cm. in diameter opening into the right ventricle just below the septal cusp of the tricuspid valve and into the left ventricle immediately below the aortic orifice; the aorta communicates with both ventricles above the aperture.

The *tricuspid orifice* is much dilated, cusps thickened, and a calcified deposit between two cusps. The left auricle is relatively small, and the left ventricle is slightly enlarged and hypertrophied. The right ventricle is much hypertrophied and dilated.

Lungs.—The pulmonary arteries and branches are hypertrophied with numerous fat flecks and streaks on intima; the cut ends of branches standing out like bronchioles on the surface of congested brown lungs; no pneumonia. Firm back-pressure spleen; hard purple nutmeg liver; the right kidney only is present with single ureter and single ureteric orifice in bladder. There is a mass of fibrous tissue in the site of the left kidney containing rudiments of renal pelvis with below it a cystic mass 3 × 2 cm., containing dark green fluid and having a duct leading downwards from it for 4 in. and ending blindly. Fibrosis of capsules of both ovaries is present. The uterus is bicornuate. Great congestion of brain; area of cystic softening 3 cm. diameter in right internal capsule.

FIG. 2.—The right side of the heart laid open showing the various defects described in the text.

COMMENT

Dilatation of the pulmonary artery is common in congenital heart disease, and may be found in association with various malformations—for example, patent ductus arteriosus, valvular pulmonary stenosis, and with septal apertures. When there is a large defect in the interauricular septum, the pulmonary artery is usually much dilated, often to aneurysmal proportions, while the aorta is hypoplasic. The large size of the pulmonary trunk and the smallness of the aorta have been attributed to an abnormal division of the common arterial trunk. Great enlargement of the right heart chambers is always found in addition. The radiological picture is often characteristic, and has been clearly described by Assmann.[5] The special features are the small aorta, dilatation of the pulmonary artery, enlargement of the right heart, and absence of any left auricular enlargement.

These patients often reach adult life, and the physical signs may be scanty unless pulmonary incompetence develops, as in the present case. Cyanosis is often absent until late and the lesion may not be recognised until adult life is reached. Sometimes mitral stenosis of rheumatic origin is present in addition to the congenital defect in the interauricular septum.

A clinical diagnosis of aneurysm of the pulmonary artery and patent interauricular septum was justifiable on the physical examination, while the autopsy revealed, as is so frequent in cases of congenital heart disease, a multiplicity of lesions. Undoubtedly the pulmonary aneurysm here was the result of the much increased blood pressure of long duration within the pulmonary circulation caused by the multiple communications between the two sides of the heart.

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MEDICAL SOCIETIES

SOCIETY OF MEDICAL OFFICERS OF HEALTH

A MEETING of the fever group of this society was held in London on Nov. 30th, with Dr. H. STANLEY BANKS, the president, in the chair. A discussion on

Puerperal Sepsis

was opened by Dr. J. M. GREENWOOD, who based his remarks on the cases treated in Monsall Hospital, Manchester, in the year ending July 31st, 1934. During this period, he said, 196 women were discharged from the puerperal sepsis unit of the hospital, and they could be classified as follows:—

1.	Sepsis following full-time labour	112 cases
2.	,, ,, abortion	62 ,,
3.	Admitted as septic but not considered to be septic	22 ,,

General peritonitis was found in 12 instances and septicæmia in 11 (anaerobic cultures were not performed); 4 women had a septicæmia associated with the peritonitis. Of all the patients admitted 53 per cent. had had a normal labour, and the labour was also described as normal in 55 per cent. of the cases of peritonitis and 20 per cent. of the cases of septicæmia. The main features of the cases of general peritonitis, which differed considerably from those enumerated in text-books, were as follows: gradual onset; anxious expression; tympanites; vomiting (50 per cent.); diarrhœa (33 per cent.); rigors (75 per cent.); pains, varying from none to rather severe; rigidity of abdomen not found in any case; temperature usually ranged between 100° F. and 103° F.; pulse-rate ranged between 120 and 140 per minute. Operation was performed wherever there was any doubt, and it was found that no abdomen had been opened unnecessarily. Cases of peritonitis were not admitted much earlier than others, this probably being due to the difficulty in diagnosis; but cases of septicæmia were admitted rather earlier. There were 16 deaths among the 196 patients—a mortality of 8·1 per cent. Four of the patients, however, died from causes other than puerperal sepsis and, as already stated, 22 cases were not considered septic; hence it would be truer to say that 12 patients died out of 174 suffering from puerperal sepsis—a mortality of 6·7 per cent. In all the fatal cases it was observed post-mortem that the uterine wall was infiltrated with white cells. In one specimen, obtained by subtotal hysterectomy from a patient with peritonitis following perforation of the uterus and abortion, a well-marked leucocytic barred line could be seen microscopically; this patient recovered.

Treatment aimed not only at the cure of complications but also at their prevention. Glycerin irrigation of the uterine cavity was employed as a routine in view of the good results obtained at Monsall Hospital and reported by H. J. Phillips to the Royal Society of Medicine in 1926. Phillips found that the incidence of complications was halved after glycerin douching was introduced, and the average stay in hospital was reduced from 48 to 26·2 days. The duration of stay must vary with each medical officer, but all the patients in Dr. Greenwood's series were able to walk up and down a flight of stairs before discharge and the average duration was 25·4 days after full-time labours and 22·5 days after abortions. Glycerin irrigation of the uterus was employed in cases of septicæmia and peritonitis; intramuscular arsenic was used in septicæmia and appeared to be of some value; but antiscarlatinal antitoxin was used in only a few cases—e.g., puerperal scarlet fever. It was considered that the report of Benson and Rankin (THE LANCET, 1933, i., 848) on 114 cases of proved septicæmia, demonstrated that serum was of no value in this condition. The treatment of peritonitis resolved itself into early diagnosis and laparotomy, but the results were very unsatisfactory; it was found that all the patients with a hæmolytic streptococcal peritonitis died.

Dr. LEONARD COLEBROOK spoke of the results of treatment by antistreptococcal sera in cases admitted to Queen Charlotte's Hospital, London. They afforded no evidence that the serum had been useful but rather suggested that it might sometimes have had a harmful effect. He thought there was need for a careful investigation of this latter possibility and that nothing was to be gained by the continued use of the sera now available.

Mr. JAMES WYATT said that he regarded diarrhœa as almost a constant symptom in general peritonitis; in some of Dr. Greenwood's cases it might have been present a day or two before admission.

Dr. R. A. O'BRIEN said that serologists would be deeply interested in Dr. Colebrook's figures and deductions. He did not think that the collected figures from the whole country would bear out the interpretation which Dr. Colebrook drew from his series. Though the old style of antistreptococcus serum showed no protective value in the laboratory, the modern concentrated streptococcus antitoxin used in scarlet fever would save the lives of rabbits given lethal doses of either filtrate or culture of hæmolytic streptococci, whether obtained from scarlet fever or puerperal patients. It was difficult to accept the view that horse serum was harmful to human beings, for the huge series of cases treated in America with antipneumococcus serum, either concentrated or unconcentrated, had never shown a higher mortality among the serum-treated than among the controls.

Prof. JAMES YOUNG spoke of the route of infection in cases of peritonitis. There could be no doubt that spread along the open veins of the uterine wall was common and it was possible that the peritoneum became involved thence. As evidence against a spread through the Fallopian tubes he referred to cases of criminal abortion in which acute peritonitis developed in the absence of any microscopic evidence of tubal infection. Prof. Young agreed that Dr. Colebrook's figures seemed to suggest that the use of serum in puerperal sepsis might seriously aggravate the risk. The findings were of such clinical importance that they demanded a thorough investigation of large and comparable groups of patients.

Dr. SAGE SUTHERLAND gave a survey of the case-mortality from puerperal sepsis at Monsall Hospital during the 24 years 1910–33, showing a steadily increasing proportion of recoveries. The highest death-rate was 28·8 per cent. in 1920, and the lowest was 7·9 per cent. in 1923. Owing to arrangements made for the admission of cases from districts outside the city boundary the numbers of cases under treatment had increased in recent years. Since 1926 certain cases had been notified as puerperal pyrexia, but only those in which the diagnosis of "puerperal pyrexia" had been changed to "puerperal sepsis" were included in the tables. During the seven years ending in 1933 the incidence of septicæmia among 1130 cases of puerperal sepsis was 12·7 per cent., and septicæmia was diagnosed as the cause of death in 54 cases, giving a mortality-rate of 37·5 per cent. Peritonitis occurred in 31 cases in this series, showing an incidence of 2·7 per cent., and all of them were fatal. During the last twelve months, however, out of 9 cases of puerperal peritonitis 3 recovered. This was attributed to resorting to operation at a much earlier stage, and, as Dr. Greenwood had pointed out, in no case had the abdomen been opened in error. The incidence of the principal complications other than septicæmia and peritonitis were as follows:—

Complication.	Cases and incidence per cent.	Complication.	Cases and incidence per cent.
Parametritis	65 (5·8)	Pelvic abscess ..	9 (0·8)
Phlegmasia alba dolens	51 (4·5)	,, cellulitis } ,, thrombosis }	7 (0·6)
Pulmonary embolism } Cerebral ,, }	22 (1·9)	Pleurisy	5 (0·4)
Insanity	13 (1·2)	Mammary abscess .	2 (0·2)
Pyosalpinx } Pyæmia }	11 (1·0)	Streptococcal empyema	1 (0·1)

Dr. Sutherland referred to minor septic infections unassociated with subjective symptoms as a possible source of morbidity resulting from the puerperium, the only sign leading to diagnosis in many cases being the objective symptom of subinvolution of the uterus; the absence of subjective symptoms was due to the insensitivity of the larger portion of the pelvic generative canal, sometimes spoken of as the "great silent area of the pelvis." In his opinion infection was more readily spread by the lymphatic drainage system than by the return blood circulation, and there was some analogy between puerperal infection and infection of the blood stream from a poisoned wound through the lymphatic system. Thrombophlebitis usually remained undiagnosed until cerebral or pulmonary embolism occurred, and the absence of success in treatment was often due to the difficulty of definitely tracing the primary source of infection of the blood stream and lymphatic supply until the symptoms had progressed beyond the most favourable period for treatment. The greatest hope lay in careful diagnosis and expert clinical knowledge, which could only be acquired by an extended experience of cases of this nature.

The PRESIDENT recalled the crude methods of treatment of puerperal fever adopted in fever hospitals some twenty years ago, and stated that in Glasgow the case-mortality rate about that time was constantly round about 30 per cent. To-day they were told that the rate both in Manchester and London hospitals had dropped in recent years to 8 per cent. Since the latter figure was exclusive of "puerperal pyrexia" cases it was difficult to resist the conclusion that solid progress had been made in the treatment of puerperal fever since the war. What were the factors responsible for this achievement? It was now becoming quite clear that neither the old anti-streptococcal serum nor the newer streptococcus antitoxin exerted any beneficial effect in puerperal septicæmia and peritonitis, which were the forms responsible for most of the deaths. Whether the antitoxin was of value as a prophylactic against these grave forms was, he thought, neither proved nor disproved. The other principal new factor in recent treatment was glycerin irrigation of the uterus. He understood that both the leaders in the discussion had adopted this method. His own experience of it was entirely favourable, provided correct technique was employed. The available evidence appeared to him to suggest that the substitution of glycerin treatment for former crude methods had had a favourable influence on the fall in mortality. In one particular form—viz., puerperal scarlet fever, where presumably the Dick toxin was a principal noxious agent—treatment by intravenous antitoxin was, in his experience, attended by strikingly favourable results. Dr. Colebrook's thesis that the use of serum in puerperal fever was actually harmful had been strikingly presented, but caution must be exercised in drawing conclusions as to the use of serum from animal experiments. He had frequently given hundreds of cubic centimetres of horse serum intravenously with apparently beneficial result, except perhaps in patients so ill as to be beyond the power of reaction. The suggestion that certain horses appeared to give a toxic serum was one that called urgently for investigation. In an extensive experience of the use of scarlatinal antitoxin intravenously he found, with all the makes of serum which he had tried, that particular batches were occasionally encountered which were entirely unsuitable for intravenous injection owing to the severe immediate reactions which they produced. None of the suggestions so far advanced by serum-makers afforded a satisfactory explanation of this phenomenon.

ROYAL SOCIETY OF MEDICINE

SECTION OF OTOLOGY

A MEETING of this section on Dec. 7th, with the president, Mr. E. A. PETERS, in the chair, was chiefly devoted to a discussion on

Meningitis of Otitic Origin

Mr. T. B. LAYTON said he proposed to speak of meningitis originating from a previously uninfected ear—i.e., secondary to a fresh infection of the middle-ear cleft. Diagnostic lumbar puncture might sometimes be needed to show whether in a given case the condition was really otitic meningitis, or whether it was tuberculous or cerebro-spinal meningitis associated with a running ear. In treatment, whatever the stage of the illness, the first essential was to remove the factory of micro-organisms; failing that, he did not think there was hope for any case, but if it were done he would not regard any case as hopeless. After the mastoid operation he turned the pinna on to the skin of the face, fixed it there temporarily with a stitch, and used a gallon of saline solution to irrigate the part, two or three times a day for three days. In the after-treatment the two requisites were absolute rest and irrigation with large quantities of fluid.

In the early stage of otitic meningitis nothing might be evident beyond rigidity of neck muscles—he disliked the term "meningism"—and at this stage lumbar puncture was unnecessary; it wasted time and might do harm. Cases seen by the otologist at this early stage should usually be saved. When Kernig's sign had appeared—as a rule, before the abdominal reflex was lost—a report on the cerebro-spinal fluid should be obtained within two or three hours. The fluid might be clear, opalescent, or even thick, and if it was clear only the treatment common to all stages was necessary. If it was opalescent therapeutic lumbar puncture should be performed for the removal of fluid. If the patient was under the anæsthetic and operation was about to be performed he would not advise draining the theca; but on the following day a quantity of spinal fluid should be withdrawn, and this should be done twice daily for two or three days, by which time the patient was well on the way to recovery, or else the condition was hopeless. If the neck was rigid and Kernig's sign was doubtful he considered the outlook grave; it was grave, too, if in such a case the patient complained of pain in the back. Vomiting he did not regard as an early sign of meningitis, and he was not certain that headache was. The headache of meningitis must be distinguished from that due to irritation of the external surface of the dura mater. A patient who showed Kernig's sign and had lost his abdominal reflex or had headache was beginning to pass into the late stage; he lay on his side with his head thrown back and his tongue heavily furred. Formerly Mr. Layton had wondered whether it was worth while to tackle such a case, but after saving one or two which were apparently in extremis he did not now take a hopeless view of them. Prognostic lumbar puncture was imperative, and the fluid must be examined for micro-organisms; if hæmolytic streptococci were found the chance of recovery was very small, but always one should consider what could be done besides the ordinary measures, including in this consideration thecal therapy. He did not think, however, that the insertion of any drug (other than sera) into the theca was of any use.

Mr. NORMAN JOBY said it had been found that a litre of cerebro-spinal fluid was formed in 24 hours. It contained up to 5 lymphocytes per c.mm., and the total protein increased as it passed down the cord. Normal cerebro-spinal fluid was sterile, and a pressure of 200 mm. or more must be regarded as pathological. Of 39 cases of acute septic lepto-meningitis in one London hospital, most of the patients being children, 36 were fatal. In 29 of the cases there was acute or subacute infection in the mastoid, and micro-organisms were recovered from the cerebro-spinal fluid in 21. In 3 the labyrinth was found at autopsy to be infected. In all the cases the chlorides were below 700 mg. per 100 c.cm.

Dr. C. P. SYMONDS held that neck stiffness and Kernig's sign were due to irritation of posterior nerve-roots; he did not regard them as signs inseparable from meningitis, and their absence did not necessarily mean that meningitis was not present. In aseptic, serous, or sympathetic meningitis—which were all the same thing—the cerebro-spinal fluid was clear and contained a high proportion of lymphocytes, without any great reduction of chlorides. The same kind of fluid, however, could be found at an early stage of septic meningitis, and this was important; for if the otologist waited for a thorough smear examination, or for the results of culture, the report would be of little practical use when it arrived. At one time he had feared that lumbar puncture facilitated the passage of micro-organisms to the meninges, but this idea had been combated in the United States. He still feared, however, that withdrawal of spinal fluid might lead mechanically to rupture of adhesions, and so favour the conversion of a local meningitis into a diffuse one. He knew of a case in which a patient with an extradural abscess rapidly developed a diffuse meningitis after lumbar puncture. The danger was much reduced if no more than 2 c.cm. was removed, and if a very fine needle was employed to ensure slow withdrawal. Dr. Symonds doubted the efficacy of serum in these cases, and his objection to its administration intrathecally was that it provoked a reaction of the meninges. He thought that in every suspicious case the patient should be within easy reach of an aural surgeon before lumbar puncture was performed.

Mr. ERIC WATSON-WILLIAMS (Bristol) said his experience had been that meningitis most commonly followed chronic otitis, or chronic recurring otitis. He did not regard neck rigidity as of much prognostic significance, for five out of twelve cases had not presented that sign in the early stage, and three of these had died. Nor did he think drowsiness to be a grave symptom; drowsy patients seemed to get well as often as the others. Two factors which had a direct bearing on the prognosis were the presence of organisms in the fluid (not necessarily a fatal factor), and the interval between onset and operation. In three cases he had adopted the somewhat desperate measure of draining the cisterna pontis through the external auditory meatus, and one of the three had recovered. Even if there were living organisms in the spinal fluid the outlook was not necessarily bad, provided that operation was promptly performed on the ear without exposing large areas of dura. He did not think it was of any use to inject drugs into the theca, and he was not convinced of the value of sera. To await the ordinary pathological report on fluid was to waste very valuable time before operating.

The PRESIDENT said there were two groups of cases: in the first, which might be called "infection owing to approximation," the infection passed through all protecting barriers; the other group comprised

those already mentioned in the discussion. There were recorded cases in which the paths of infection included the labyrinth, the auditory nerve, the saccus lymphaticus, and the aqueduct of the cochlea. He thought the condition known as "meningismus" was much commoner than was generally supposed.

Mr. SYDNEY SCOTT said he saw no harm in diagnostic lumbar puncture provided only 2 c.cm. of fluid was withdrawn. He insisted that statistics should include only cases in which micro-organisms were found in the cerebro-spinal fluid; otherwise the figures of different hospitals and workers would not be comparable, and many wrong conclusions would be inevitable. Stiffness of the neck or retraction of the head he considered very important as signs of meningitis, but he would not diagnose the condition on these alone, and lumbar puncture should be done. He referred to the case of a boy with acute otitis media who had violent headache but no head retraction. Lumbar puncture was done, and the fluid withdrawn was clear, but the pathologist reported that it contained pneumococci. Five days later the clinical signs of meningitis developed, and after a long illness the boy died of pneumococcal meningitis. In fatal cases he thought the cause of death was either encephalitis or septicæmia. The so-called "lucky" cases were probably those in which the organisms were of relatively low virulence and the patient had virile antibodies. Thecal drainage seemed to have only a limited applicability—namely, in cases where the infection could be traced through the labyrinth.

Mr. F. HOLT DIGGLE (Manchester) commented on the change in the treatment of this condition since eight years ago. Various major operations were then carried out—not only translabyrinthine drainage, but also operations for approaching the foramen magnum. Even at that time, however, he had felt that repeated lumbar puncture would remain the method of choice. His own view was that if a patient had headache, perhaps with a little vomiting but with no other clinical evidence of meningitis, then, especially if the mastoid was tender, the primary focus should be dealt with; but he would not disturb the lumbar theca if there was a danger of spreading the infection in this way. If the headache persisted 48 hours, lumbar puncture should be done. Examination of the fluid would make it possible to decide whether lumbar puncture should be repeated. Research might well be done, he thought, to ascertain what antiseptic substances would pass into the cerebro-spinal fluid from the venous circulation; there was no doubt that the choroid plexus was selective. In a few of his serious cases he had relied on intravenous injection of antistreptococcal serum and repeated lumbar punctures in the belief that some of the serum would pass over.

Mr. C. P. WILSON asked whether it was Mr. Layton's practice to expose the dura of both fossæ when doing the radical mastoid operation. If so, how much bone did he remove?

REPLY

Mr. LAYTON, in reply, said he never did a radical mastoid operation in these cases; the only ones in which it might be necessary were those in which the inflammation had spread from the middle-ear cleft to the meninges, far forward in the roof of the middle ear. As regards diagnosis, what he objected to was a more or less indiscriminate lumbar-puncturing of children by house surgeons without a clear idea of what was expected from it. He agreed that, in the end, it was the virulence of the organism which decided recovery or death. He did not think that his hearers generally took the same view of neck stiffness as he did; if looked for, however, it could be recognised long before head retraction developed, and he had never seen a case of otitic meningitis in which it was not present. It was usually absent, on the other hand, in nasal meningitis. Practitioners should be given to understand that in order to save these cases of otitic meningitis the aural surgeon must be called in at the stage when the only sign was neck stiffness. If a patient had labyrinthine symptoms they were symptoms not of meningitis but of the lesion of access which preceded it; he thought that was the meaning of the vomiting in the early stage of acute cases. A child might vomit because of acidosis, but if that was not the cause the vomiting must be looked upon gravely, especially when there was a running ear. Antiseptics killed putrefactive organisms, but probably did not kill hæmolytic streptococci. In cases where there was a sinus phlebitis it was best to deal with the meningitis first and the phlebitis later.

Dr. SYMONDS, in a brief reply, said he would be disinclined to accept a pressure reading as evidence of meningitis unless he knew of some abnormality in the cells of the cerebro-spinal fluid.

BRITISH INSTITUTE OF RADIOLOGY

IN the course of the eighth annual congress of the Institute, held at the Central Hall, Westminster, from Dec. 5th–7th, the seventeenth Silvanus Thompson memorial lecture was delivered by Prof. H. H. BERG of Hamburg, who took as his subject

Clinical Radiology of the Digestive Mucosa

Older methods of radiology, he said, concentrated chiefly on disorders of function and had to be developed in such a way as to give an unequivocal picture of the lesion. They were based throughout on the solid ground of anatomy. Dissatisfied with diagnosis thus afforded, he had endeavoured to improve the technique. The first essential for his method of studying the mucosa was complete emptiness of the viscus; the best results were obtained if the inner surface was "dry." The stomach must be emptied, if necessary with a stomach-tube, and the colon must be cleaned out with several enemas. A thick watery suspension of opaque mixture was given by the mouth, but for demonstration of the details of the œsophagus a jam-like consistency was preferable. Small amounts only should be given—enough to fill the depressions of the mucosal pattern with a thin layer, leaving the tops of the folds free. This thin layer could be distributed by giving various amounts of the suspension, by altering the position of the patient, and by graduated compression. Quick changing from horizontal to oblique or erect position was of special value. Radiograms of every important detail could be taken at a moment's notice. The clinical aspect of the screened case should never be forgotten, and the radiologist should be proud of his general clinical education. It was better if he took his own case-histories.

Ordinarily the healthy mucous membrane was characterised by softness, pliability, active motility, and a moderate amount of secretion. The œsophagus showed thin longitudinal folds, especially in its lower part; the stomach showed longitudinal folds at the lesser curvature, usually diverging at the beginning of the antrum, and wave-like folds at

the greater curvature. In the small intestine the folds were apt to change rapidly from transverse to longitudinal during contraction. In the large intestine there was enormous variability but generally the folds were longitudinal in contracted areas and transverse in dilated areas. Pressure from without caused displacement, flatness, broadening or disappearance of the folds. Inflammation caused elevation, swelling, coarseness, and stiffness. Atrophy and erosions were not generally visible. Ulceration produced a crater with a smooth, elevated border and cicatrisation gave the appearance of stellate folds converging on the ulcer. An infiltrating growth showed torpescence and loss of folds; an expansive one a sudden discontinuance of the folds. New growth might also produce irregular protuberances and craters. (Dr. Berg demonstrated these appearances on the screen.)

More than five per cent. of gastro-intestinal hæmorrhages resulted, he said, from bleeding varices, generally the consequence of portal cirrhosis. The condition was relatively common and was easy to diagnose if properly sought, even before symptoms had appeared. Generally the radiogram showed distorted worm-like elevations varying with respiration. A thin layer of barium adhered to the mucosal surface longer than normal. Leukoplakia of the œsophagus was characterised by small flat elevations corresponding to those seen in the post-mortem specimen.

There were few better illustrations of the progress made in diagnosis than the results of diagnosing post-operative gastric disturbances. The recognition of gastro-jejunal changes had reached a remarkable degree of accuracy and it was now as easy to diagnose gastro-jejunal ulcer as duodenal ulcer. An inflammatory condition was indicated by swelling of the folds in the stomach and efferent loop; sometimes the folds changed into turgescent cushions. The swelling of the margins of the opening caused narrowing of the lumen which was often interpreted as spasm—with which, indeed, it might be combined—but the essential factor was the œdematous swelling. Gastro-jejunal ulcer occurred nearly as often after resection as after gastro-enterostomy. Not even the best surgeon could prevent an ulcer in every case. Young patients with hereditary gastric trouble were especially liable to it, and a fungus was fairly often found. The gastro-jejunal mucosa of the operated stomach very seldom presented a completely normal appearance. A certain degree of elevation of the folds was very common but was not in itself sufficient for diagnosis. Stiffness, coarseness, and severe swelling were nearly always the result of inflammation and often caused intermittent pain. Crater-shaped ulcers were a frequent finding, especially in the neighbourhood of the anastomosis in the efferent loop. The niche of the ulcer was not always visible immediately after the first swallow and the radiologist should wait until some of the barium had passed from the stomach, cleansing the surface of its mucus. A second examination immediately after the first was extremely important for the demonstration of post-operative lesions. The transverse colon should always be examined carefully although gastro-colic fistula was now rare.

The new method of studying mucosal relief had proved its value especially in the diagnosis of malignancy. The smallest cancer Dr. Berg had ever diagnosed was the size of a thumb-nail and nobody had believed him. Six months later, when removed, it had been the size of a goose's egg. There had also been progress in the differentiation of malignant and benign changes. Chronic prepyloric ulcer might look very like malignancy. Chronic gastritis might suggest cancer because of the stiffness of the coarse mucosa. The verrucose form of chronic gastritis was regarded as precancerous. There were cases which even the pathologist could not clear up without the microscope. Errors were always possible if the viscus was not empty and it was quite normal to find a small amount of fluid in the fasting stomach. Larger amounts of fluid, due to hypersecretion mixed with barium suspension, sometimes looked slightly spotted as a result of flocculi of mucus floating in the juice. Larger filling defects were caused by retention of food; irritated gastric mucosa, especially if there were pyloric changes, could hold on to small particles of food, particularly vegetables. Air bubbles moved and rose to the surface. Careful screen work was always the best prophylaxis against error.

Exhibition of Radiological Apparatus

This year's exhibition was marked not so much by outstanding innovation as by the development of ideas already executed, and by the consolidation of advances recently made. Last year saw the almost universal adoption of shock- and ray-proof tubes for all purposes; manufacturers this year were showing safer and better casings and other devices and consequential modifications. One new invention does, however, promise to be of considerable importance to the practising radiologist, and that is the valveless rectifier shown by a well-known firm. Rectification by means of copper oxide-coated plates is no novelty in certain applications of electricity to industry, particularly in dust precipitation, but this year it has been applied to X ray generation for the first time. The current is passed through an arrangement of discs of copper oxidised on one side and polished on the other and connected in series. This pile allows the current to pass in one direction but not in the other; it behaves in this respect in exactly the same way as the ordinary hot-cathode rectifying-valve. Whereas, however, the valve deteriorates after a certain not very long period, the copper oxide rectifier never wears out. Its extra expense is therefore more than justified. The present rectifier does the work of a single valve, and developments are being elaborated to replace the more complicated multivalve rectifiers which are used for converting three-phase supply and for producing continuous high-tension current. The model at the exhibition was rated for 200 KV and 30 ma. current, and was oil-cooled. It is available for ordinary diagnostic work and also in a modified form for deep therapy. The apparatus has already been adopted by a well-known municipal hospital, and the results of its use will be interesting news.

The opinions both of radiologists and of general practitioners are divided on the value of the ultra-light portable set for diagnosis in the home. Some authorities consider it a valuable adjunct to clinical investigation; others an expensive, possibly dangerous and probably misleading toy. There seems no reason why in the hands of the practitioner who has a definite flair for its use it should not be of value, provided he recognises its and his own limitations. The latest of these mobile units packs in a neat wooden suitcase which weighs, complete, 43 lb. The tube and transformer are mounted together and encased in a shock- and ray-proof cover about the size of a quarter-plate box camera. This is fitted with a handle and can be manipulated as easily as the ordinary electrical hair-dryer and almost as

easily as a Kromayer lamp. Its applicator can be pushed deeply into the groin for a radiograph of the surgical neck of the femur, or into the axilla for a shoulder-examination, or held up against the face. It can also be used on a stand. It is designed to work at 70 KV and 10 ma.

Another piece of apparatus on which expert opinion is divided is the combined couch and screening-stand. Some radiologists object to these ingenious pieces of mechanism as being likely to alarm a nervous patient, whose courage is already strained by an unfamiliar environment. Others feel that this drawback is unimportant compared with the advantage of saving space and expense, and still more, during a delicate screen examination of—for instance—the intestinal tract, of being able suddenly to move a patient from one position to another in order to observe the subtle changes in the appearance of the mucosa. The smooth, silent movement of these couches is a tribute to the mechanical perfection of their manufacture, and is comparable to the effortless passage of a fish through water. A difficulty has, however, been introduced with the shock-proof tube. This is as a rule fed by leads encased in heavy rubber pipes, and it is almost impossible to prevent these from dragging and thereby upsetting the fine balance which is so necessary. To meet this objection one firm has introduced a tilting couch containing a ray-proof tube which is not fitted with the ordinary shock-proof casing but is rendered shock-proof by enclosing the whole of the under-couch space in a substantial metal shield, which is earthed. The shock-proofing thus extended is as efficient as that provided by the ordinary tube casing, and is free from the disadvantage of the heavy leads.

Some visitors to the exhibition may have hoped to find apparatus capable of running at more than the standard 200 KV. Heartening stories are coming from various hospitals abroad and, recently, in this country, about the results of irradiation with ultra-short X rays, approaching the gamma rays of radium. Such apparatus seems, however, to be at present in a more or less experimental stage, and no exhibitor in London has so far ventured to standardise it. There is a definite technical reason for this sticking-point in the neighbourhood of 200 KV—it is actually at about 180, the 200 KV tube on full output being theoretically somewhat overloaded. Should the value of the higher voltages become more established, no doubt manufacturers will make the extra effort required to produce apparatus capable of generating them.

REVIEWS AND NOTICES OF BOOKS

Psychology and Life

By LESLIE D. WEATHERHEAD, M.A., Certified Teacher of Psychology under the Board of Education. With forewords by Sir HENRY B. BRACKENBURY, M.D., LL.D., Vice-President, British Medical Association; and WILLIAM BROWN, M.D., D.Sc., F.R.C.P., Wilde Reader in Mental Philosophy in the University of Oxford. London: Hodder and Stoughton. 1934. Pp. 320. 5s.

THIS century has witnessed the development of an insight into mental processes which has changed our attitude not only to the victims of "nervous breakdown" but also to their robust and impatient critics. This new knowledge provides common ground between those concerned with the care and cure of the spirit, the mind and the body, and it is encouraging to see the speed with which, having once been assimilated, it is being interpreted in popular books. The latest of these to reach us is one of the best of those by non-medical authors—in so far as Mr. Weatherhead has set himself to enlighten, simply and yet without patronage, "ordinary folk," whom he assumes to be ignorant of current psychological conceptions. He takes pains to show that these are not only compatible with religious belief, but that their study is now essential to the minister who aspires to be of real help to his flock. In a preliminary chapter on psychology, religion and healing he sets out his main thesis: that while often neither religion nor medicine can cure symptoms arising from mental conflict until their cause is realised by the patient, when this stage has been reached religion can be a great therapeutic agency. He pleads convincingly for better psychological training for ministers, schoolmasters, and doctors; while endorsing this plea we would suggest that he underrates the quality of the teaching on the treatment of the neuroses and psychoneuroses nowadays available to medical students. The advice to "pull yourself together" or to "make an effort," which he justly condemns, is usually given not by the patients' medical advisers but by relatives and friends inconvenienced to exasperation by their state.

In subsequent chapters he deals adequately with the material and province of psychology, the levels of the mind, the importance of the unconscious, the energies of the mind, repression and self-control, the inferiority complex, the mind of a child, fear, anxiety, phobia and worry, and depression and irritability. These later chapters will satisfy the demand for concrete examples and for advice applicable to personal problems to an extent unusual in books of this kind; especially from the section on worry is the reader likely to get practical help. Another advantage in the later chapters is the omission of the numerous quotations and footnotes giving references to other authorities which spoil the continuity of the earlier sections. In a future edition Mr. Weatherhead might consider whether a bibliography at the end of each chapter would not serve his purpose, without interrupting the easy flow of the message he has distilled from his wide reading.

Acute Intestinal Obstruction

By MUNROE A. MCIVER, M.D., Surgeon in Chief, Mary Imogene Bassett Hospital, Cooperstown, N.Y. New York: Paul B. Hoeber. 1934. Pp. 430. $7.50.

THIS considerable monograph is divided into three parts. In the first the varieties of intestinal obstruction encountered are described. This occupies about one-half of the volume, and is rendered the more valuable in that clinical histories with comments by the author are interpolated. It is a very satisfactory section. In it we find a discussion of the newer views of pathology, the changes in body fluids, and the bearing of physiology upon the phenomena observed. All the new knowledge which has accrued since the great classical work of Treves appeared nearly thirty years ago is summarised. In the second part the diagnosis and the treatment of the condition are fully considered. Such questions as the value of morphine, the diagnostic assistance of X rays, the real place of enterostomy, and the use of saline infusions

all receive adequate discussion. A captious critic might say of this section that its usefulness is somewhat impaired by the open-minded attitude of the author. It is true he is not dogmatic, but he provides all the known data with references for adjudicating on any of the multitude of problems of treatment which may arise. Indeed, on reading the third section, on the causes of death in acute intestinal obstruction, it becomes evident that our knowledge of this aspect of the subject is nebulous and vague. Dogmatism is out of place where there can be nothing but clinical impressions, and where experimental findings are so ambiguous.

This book is an important contribution to surgical literature, for in it all knowledge of any account pertaining to acute intestinal obstruction is collected. It should be on the shelves of every surgical library.

A Text-book of Histology

Second edition. By ALEXANDER A. MAXIMOW, late Professor of Anatomy, University of Chicago; and WILLIAM BLOOM, Associate Professor of Anatomy, University of Chicago. London: W. B. Saunders Co., Ltd. 1934. Pp. 662. 30*s*.

OF recent text-books on histology, this work, initiated by the late Prof. Maximow and completed by his colleague Prof. Bloom, is by far the most stimulating and instructive, and it is not surprising that there should be a demand for a second edition within three years of its appearance. The book has been thoroughly revised. Certain sections have been rewritten, notably that on nervous tissue by Prof. Judson Herrick, and that dealing with the physiology of the female genital system by Prof. G. W. Bartelmez. There are 49 new figures, and the inclusion of many new references at the end of each chapter will be welcomed. A remarkable feature of this revision is that the book is actually reduced in size, and contains 150 fewer pages than the first edition and some 70 fewer illustrations. Part of this reduction has been achieved by setting many of the details in small type, but everywhere one notes a vigorous pruning and condensation. Whether this is an improvement or not depends on the taste of the individual reader. Apparently it has been carried out in response to the representations of many teachers who found the original volume too large for students beginning the study of medicine, but this reason appears to us to be entirely inadequate. The work is of far too high an order ever to become a mere cram book, and there are other publications which serve this purpose. May we hope that in the preparation of future editions Prof. Bloom will resist any further temptation to cater for those who prefer their meat potted? As it stands, his book has an educational value which we hope it will always retain.

Parenthood: Design or Accident?

Third edition. By MICHAEL FIELDING. London: Williams and Norgate, Ltd. 1934. Pp. 208. 2*s*.

THE first edition of this book, published in 1928, was reprinted four times; the second, published in 1930, was reprinted nine times. These facts testify to the usefulness of the little volume which is now well known to the medical profession. The author, a medical man who writes under a pseudonym, has successfully performed a difficult task; he has written a book which satisfies the requirements both of the lay reader who seeks guidance in the conduct of the intimate affairs of his own life, and of the doctor who desires information on how to advise his patients. The book contains valuable additions which bring it up completely to date; it includes a full list of privately run birth-control clinics to whom doctors may wish to refer their patients, and it summarises in clear language the latest researches which, it is hoped, may yield the improved methods of the future. The author has, moreover, not hesitated to set out, where he deemed appropriate, the names and addresses of those manufacturers of contraceptives whom he has good reason for regarding as reliable. By running the risk of being suspected of interest in the sale of certain products, which suspicion would obviously be unjust, he has added to the value of the book to many medical readers who are at a loss when asked to advise their patients on the purchase of contraceptives.

Of the many books written on the practical problems of birth control, this is likely to be the most serviceable to medical readers.

The Myth of the Mystic East

By Lieut.-Colonel R. H. ELLIOT, M.D., Sc.D., F.R.C.S., late of the Indian Medical Service. London: Blackwood and Son, Ltd. 1934. Pp. 301. 7*s*. 6*d*.

"I have not the least hesitation," says Colonel Elliot, "in stating my conviction that the Mystery of the East is a myth. . . . Mystery fades and mysticism vanishes as soon as you get to grips with your subject. An ordinary and simple explanation is invariably available in the long run, though it may have to be waited for until the necessary data have accumulated." This, in a nutshell, is the message of this readable and stimulating book. Beginning with research upon the nature of snake poisons, Colonel Elliot, himself an expert conjurer, was led to examine the problems of native conjuring and then to investigate the religious and other customs of the Indians. As chairman of the occult committee of the Magic Circle, an office held for 15 years, he has had the opportunity of investigating the claims of many persons to have witnessed the rope trick; and he sums up his conclusions in a chapter on this subject which is calculated to instil a healthy scepticism in the reader. But though Colonel Elliot denies that any of the phenomena he witnessed demand supernatural explanations, he has nevertheless wondered at some of the things he has seen. "I must confess to have been astonished," he writes, "at the feats of the sword-swallowers and fire-eaters. . . . I have watched these men blow out volumes of smoke and fire from their mouths and wondered how their mucous membrane can stand it. . . . Again, I have seen a man push a stiff sword blade down his gullet. The most elementary knowledge of anatomy made it obvious that it must have entered his stomach, yet he did not appear to suffer the least inconvenience from it." These phenomena while appearing to Colonel Elliot to be "natural" (in the sense of not being supernatural) are acknowledged to be remarkable. The last five chapters of the book deal with snakes. Admirers of the works of Rudyard Kipling will especially enjoy a chapter on the mongoose and the cobra. From attempts made to measure the toxicity of different snake venoms, it has emerged that the venom of the Australian tiger snake is 24 times more deadly than that of the cobra and 125 times more deadly than that of Russell's viper.

This book will be of special interest to those who have resided in India, but also to all who have wondered whether the phenomena which have puzzled so many visitors would stand the test of scientific investigation.

THE LANCET

LONDON: SATURDAY, DECEMBER 15, 1934

OVULATION AND CONCEPTION

IT is important to know at what point in the menstrual cycle ovulation takes place, for the time of ovulation indicates the time when intercourse may be fruitful. Accurate knowledge would thus be useful to innumerable people, and one would think that it could be readily obtained; but in actual fact the objections to direct experimental investigation of the period of fertility in the cycle, and to frequent observation of the ovaries, has made it necessary to rely on imperfect evidence sometimes deviously sought. Fortunately the results of various unrelated inquiries nearly all point the same way, and there is now a balance of opinion that ovulation occurs during the intermenstruum—or, allowing liberal limits, at some time between the 10th and 19th days of the 28-day cycle, counting from the day on which menstruation begins. The studies on which this opinion is based comprise observations of the ovaries at laparotomy; some (but not enough) histological examinations of ovaries and endometrium removed at known times in the cycle; the recovery of ova from the uterine tubes (in six cases, ranging between the 12th and the 19th days); and certain rather unreliable estimates of the probable ages of early embryos.[1] There are also a few acceptable data on the period of fertility in the cycle—provided mainly by K. OGINO in Japan and H. KNAUS in Austria—and some information obtained by KNAUS in experiments on the refractoriness of uterine muscle to pituitrin. The views of this worker are again brought to the notice of English readers by the publication of an excellent and well-illustrated translation of his latest book, "Periodic Fertility and Sterility in Woman."[2]

The belief that conception can occur only during a few days in the mid-interval is based on three assumptions: first, the life of the sperm must be brief; secondly, the life of the ovum must be correspondingly short; and thirdly, ovulation must take place *spontaneously* about the middle of the cycle. In his new book Dr. KNAUS sets out his reasons for thinking these assumptions sound. In considering the viability of the ovum, he draws attention to the circumovular deposition of albumin which begins soon after rupture of the follicle and which presumably makes penetration by sperms increasingly difficult; he also refers to the ingenious experiments performed by J. HAMMOND, which show that the fertile life of the rabbit ovum is but short. Unluckily the evidence about spermatozoa is neither so convincing nor so direct, based as it is on observations, partly in vitro, on motility and fertility at high and low temperatures; but the conclusion that "the spermatozoa . . . lose their fertility within 48 hours of coitus under the influence of the abdominal temperature to which they are exposed in the female genitalia" is supported by analysis of acceptable data on times of conception. KNAUS's own observations (already mentioned) on the time of ovulation are concerned with the refractoriness of uterine muscle to pituitrin when it is under the influence of luteal secretions. He first ascertained that after ovulation the rabbit uterus ceases to contract in response to injections of pituitrin, and then by extirpation experiments he showed that this change in reactivity is due to the presence of corpora lutea. Having thus provided himself with an index of ovulation, he proceeded to study the motility of the uterus of healthy women, and arrived at the conclusion that "in women with normal reproductive physiology ovulation always takes place on the fifteenth day before the onset of the period." His data were all consistent with the view that ovulation occurs spontaneously and not, as in some animals, as a sequel to coitus. In addition he adduces direct evidence in favour of his belief that fertility is limited to a few days in the middle of the cycle, citing the clinical experience of other medical men besides himself. According to KNAUS, there is no doubt that the "law of fertility" is borne out in practice, and he counters contrary statements by affirming, with some reason, that they are usually founded on miscalculated cycle dates and other inaccuracies of testimony. He lays emphasis on the lack of precise information about the duration of the menstrual cycle, and states that it is impossible to predict the period of fertility in a woman unless her menstrual rhythm is exactly known. Regarding irregular cycles, he offers the following advice: "The ovulation date of an irregular cycle is that period of time which falls between the two ovulation days of the shortest and the longest cycles respectively, the cycles being recorded for at least 12 months"; but he presents few of his data on this important problem.

In the time that has elapsed since Dr. KNAUS's book went to the press, further oblique but harmonious observations have been reported by Dr. RAPHAEL KURZROK and his co-workers[3] in New York. In a study of the urine of ten women, over an average of two cycles each, they found that the routine Aschheim-Zondek test gave the prolan A reaction during a variable short period near the mid-point of the cycle. Hitherto it has been believed

[1] Intermenstrual pain and bleeding (Mittelschmerz), which is occasionally experienced by women for a short period about the middle of the cycle, is generally supposed to be related to ovulation (see Jour. Amer. Med. Assoc., Oct. 20th, 1934, p. 1253) but the relation has not been established scientifically. Its main support, comparative data from non-human mammals (see Hartman, Amer. Jour. Obst. and Gyn., 1930, xix., 511), is doubtful.

[2] Periodic Fertility and Sterility in Woman, a Natural Method of Birth Control. Translated by D. H. Kitchin and Kathleen Kitchin, M.B., M.Sc. Vienna: Maudrich. 1934. Pp. 162 and vi. £1 4s.

[3] Kurzrok, R., Kirkman, I. J., and Creelman, M.: Amer. Jour. Obst. and Gyn., September, 1934, p. 319.

that prolan substances are not excreted in the urine of non-pregnant women in quantity sufficient to give positive results in the routine biological tests, and KURZROK and his collaborators conclude that the appearance of prolan A in these women is related to the coincident occurrence of ovulation, and that the prolan indicates the elaboration of an ovulation-stimulating substance by the anterior lobe of the pituitary. The latter part of this interpretation seems questionable: it is not yet known whether or not a specific hypophyseal hormone is a factor in the mechanism of ovulation, and in view of the fact that excretion of œstrin is increased during the later phase of the menstrual cycle, when the luteal hormones are exercising their influence, it is perhaps more reasonable to argue that the sudden mid-interval excretion of a follicle-stimulating gonadotropic hormone indicates the beginning of a post-ovulation phase of activity of a luteinising gonadotropic hormone. Whichever be the correct interpretation, it certainly seems justifiable to suppose that the excretion of prolan A in the middle of the cycle is related to ovulation. Indeed, apart from its stimulus to more elaborate work along the same lines, the chief significance of KURZROK's report is that it provides a little further evidence that ovulation as a rule takes place near the mid-point of the menstrual cycle. It remains regrettable that the testimony of women about menstrual dates related to operations and about menstrual dates of conception should usually be so unreliable from the scientific point of view; for, when due allowance is made for Dr. KNAUS's natural enthusiasm,[4] it must be admitted that our present view of the time of ovulation in man is established only on a number of unrelated and separately weak supports. This being so, it is especially valuable to know from experimental studies, such as those of C. G. HARTMAN, and S. ZUCKERMAN and A. S. PARKES, that in other primates ovulation is definitely a mid-interval event. Since direct determination of the time of human ovulation is at present out of the question, and since adequate information about woman's periodic fertility is not yet available, it is certainly desirable that more work be done on monkeys, not only to determine more exactly the time of ovulation and the period of fertility, but also to elucidate in more detail their relationship to man—both in anatomy and physiology.

TWO FACTORS IN BUSINESS LIFE

"AN account of research work carried out by the National Institute of Industrial Psychology during the years 1921–34"[5] may surprise the reader not so much by the solution of problems connected with the human factor in industry as by the statement of problems that call for solution. Yet this is inevitable. Minute investigation of the physical qualities and behaviour of the inanimate materials used in modern industry is accepted as a commonplace of scientific research, but apart from a routine physical examination of workers on entrance to some occupations the selection of human material has been by rule of thumb. A misfit must adjust itself, continue to endure and cause friction and inefficiency, or be scrapped, probably at some cost of happiness or health. One finds accordingly that the work of the institute is directed first to the development of tests to be applied in vocational guidance and selection so that failures through misfit may be diminished as far as possible. The advantages of such tests, both to employer and worker, are obvious, and though in a general account details must be lacking yet a copious bibliography indicates the wide range of occupations that have been studied with the object of making specific adaptations of general principles. The comparison between inanimate and human can be carried further. The engineer presumably studies the conditions under which a machine produces the best results, but only of recent years is it recognised that it is as profitable to study the influence of the working environment upon human efficiency. Ventilation, temperature, sanitation and the like have been regulated by our Factory Acts for many years, but even now not all employers recognise that a healthy environment pays. Moreover, the comfort of the worker, the making of his task easy by correct adjustment of materials and machinery, the reduction of boredom and fatigue are equally important, though not within the field of operation of the law, and here the institute finds scope for more activity. It is probable indeed that the adjustment of mechanical factors may become systematised and the intrinsic human problems of industry will claim fuller attention; a reference to temperamental factors and character as determining occupational success (p. 11) indicates this trend, and so does the Industrial Health Research Board's report (No. 61) on "The Nervous Temperament in Industry."

Increase of output is a natural result of improvement in working conditions but is a convenient and agreeable measure of results rather than the primary aim of industrial psychology. Efficient and smooth working in any organisation must depend upon satisfactory human relationships, and in the industry of to-day the cultivation of such relationships is coming to be regarded as essential, the increasing employment of welfare workers and the encouragement of social and sporting activities being obvious steps in that direction. From the graduate school of business administration at Harvard University comes a description of systematic methods of studying the workers' point of view, the understanding of which is plainly of first importance to industrial psychology. Acknowledging the work, along the same lines, of our Industrial Health Research Board, Prof. Elton Mayo[6] tells how there was developed a method of interviewing—confidential as regards individuals—directed to wards "the discovery of opinions that referred themselves to

[4] Knaus makes light of the dangers of promising much on the basis of our present knowledge. His attitude has recently been questioned by T. Koller, who regards the existence of a demarcated period of fertility as likely but so far unproven. (Schweiz. med. Woch., Sept. 8th, 1934, p. 827.)

[5] From the Institute, Aldwych House, London, W.C.2.

[6] The Human Problems of an Industrial Civilisation. New York: The Macmillan Company.

highly individual and personal experiences and situations." Experience soon showed that the employees wanted it; it eased their minds, it helped them to revise their too-personal opinions, and the research division of the firm realised that the whole obscure problem of human inter-relation in an industrial organisation was concealed somewhere in the dark area. Among other results of his research Mayo found that the benefit derived from rest pauses, shortened hours, provision of refreshment and such like was a secondary matter as compared with the establishment of a favourable "temperamental" inner equilibrium of the workers. Other investigators attached to the same graduate school[1] have made the generalisation—simple enough when attention is directed to it—that in every industrial establishment, in addition to a "technical organisation" which appears to the management as representing logically and technically what the actual organisation is, there is also a "social organisation" which refers to the actual personal relations existing among the employees, and between employees and supervisors. This latter includes relations on the common human level—friendships, antagonisms, and so forth—as well as larger social configurations such as collective attitudes, practices, and beliefs.

The second working system is at least as important a matter of study as the first, and a curious action in the Chancery Division, reported on another page, illustrates the unfortunate result of a clash between them. A firm of wire manufacturers were sued by some employees who declared that the presence of "efficiency experts" watching them not only hindered them in their work but even affected their nerves and spoilt their sleep. Setting aside the interesting psychopathological questions involved in these alleged phenomena, we must agree that the attempt to alter or even study one working system without taking into account the other produced an emotional, even a neurotic, reaction on the side of the men. A skilled interviewer using the methods described by Elton Mayo could obtain from these men material for a new chapter in industrial psychology, and surely a knowledge of their emotions and mental attitudes is as necessary to industrial efficiency as a knowledge of (say) the ductile properties of the wire with which they work.

HEALING OF TUBERCULOUS CAVITIES

THERE are certain types of pulmonary tuberculosis which respond well to a régime of simple rest. But though prolonged recumbency under sanatorium conditions may suffice for the healing of even widespread disease a dip in Jordan is never a welcome prescription and the exhibition of patience is less popular than the exhibition of therapeutic measures. The older sanatorium methods were often successful, but the introduction of collapse therapy marked the end of a policy that was apt to degenerate into one of laissez-faire. The new method was sound in theory, for it implied rest to the diseased lung. It was encouraging in practice, for its most impressive effects were demonstrated in the more acute forms of the complaint. And it supported the patient's morale, for it necessitated far more careful supervision, whether in or out of sanatorium, than he had been accustomed to. The recurrent operative procedures required to maintain pulmonary collapse were accompanied by an impressive ritual, to which was added a suggestion of scientific accuracy due to the measurement of insufflated air in cubic centimetres and to the exact reading of a water manometer. There is thus no need to wonder at the early popularity attained by artificial pneumothorax or for surprise if at times the means has overshadowed the end. To-day, no responsible worker denies its value—collapse therapy remains our only effective form of active treatment; but because it is all we have to offer there is a risk it may become a routine. What then are our objects in trying to collapse the diseased lung? The prevention of spread of disease, the promotion of healing in a lung, set at rest and the closure of cavities may all result from pulmonary deflation. The tendency towards excavation in tuberculosis is so pronounced that progressive disease is almost always, if not always, associated with cavity formation. With little exaggeration the treatment of phthisis has been said to be the treatment of cavities. We may gauge the success of our efforts to a considerable degree by our success or failure to banish ring-forms from the X ray picture and tubercle bacilli from the sputum. It is noteworthy that sputum examination and X ray examination usually tell the same tale.

In the practice of any art economy of means is desirable if the best results are to be secured; and medicine is no exception to the rule. We must secure our object with the minimum of interference if the risks of treatment are not to exceed the risks of disease. Radiology has taught us that many cavities will heal spontaneously if the patient will submit to rest in bed for a period of several months. Nor is this only true of small cavities. Vomicæ the size of a golf ball or a hen's egg may in suitable circumstances completely resolve without the aid of collapse therapy, for the capacity to heal does not depend upon the size but upon the character of cavities. Three varieties of cavity are commonly seen in skiagrams of tuberculous lungs. The earliest recognisable vomica is revealed as a clear area in the centre of a haze of more or less uniform density. This form of cavity does not appear to be enclosed by a wall of its own; it resembles a cavity in a Gruyère cheese. The second type of cavity is round, oval or sometimes pear-shaped. As revealed by the skiagram it is bounded by a wall, two or three millimetres thick, the density of which is not much greater than that of the preceding haze. The latter has usually cleared by the time a cavity of the second order has developed. The third variety corresponds with a late stage of the disease when fibrosis predominates. As seen in the post-mortem room, or as photographed in the X ray department, it has an irregular contour and a wall

[1] Roethlisberger, F. J., and Dickson, W. J.: Studies in Industrial Research: Technical v. Social Organisation in an Industrial Plant.

of much greater density than that of the second type. Our knowledge of the pathology of the cavities of early tuberculosis is limited, for we cannot study them in the post-mortem room. The appearance of the fibrous-walled cavity is familiar in skiagram and cadaver; its pathology is sufficiently well known. An appropriate scientific nomenclature demands accurate knowledge and it is difficult to decide what terms to apply to cavities of the first and second order. Dr. LOUIS H. FALES and Dr. E. A. BEANDET have recently suggested [1] exudative, productive, and fibrotic as qualifying terms for the three varieties of cavities as revealed by X ray examination, but it would perhaps be wiser, in our present ignorance, to refer to them simply in numerical order. The assumption that three stages of development are represented by the three types is based on the experience gained from serial skiagrams and clinical observation; it is therefore probably not far from the truth.

The experience of American practitioners agrees with that of European colleagues. The first two types of cavity are frequently observed to close and heal under a simple régime of rest, usually carried out in a sanatorium. The third or fibrotic type may become sealed off and enclosed by dense scar tissues, but seldom heals without operative compulsion. The treatment of this type is therefore collapse therapy, and we may note in passing that a simple artificial pneumothorax will seldom suffice to overcome the obstruction due to adhesions over cavities whose wall impinges on the periphery. When collapse therapy is proposed for the treatment of cavities of the third degree we must be prepared for disappointments unless we have also the means at our command for intra- or extra-pleural pneumolysis. Cavities of the first and second order often close spontaneously if the patient is confined to bed. The time required for healing, as determined by X ray control and disappearance of tubercle bacilli from the spit (or more commonly its cessation), varies from a few weeks to several months. Self-discipline is therefore essential if success is to be attained. Such discipline is however only irksome in the earlier weeks; if these can be supported with tolerable resignation after-treatment is usually easy. Rest treatment obviates the risks inseparable from collapse therapy and when healing is complete there is neither pleural thickening nor mediastinal displacement. The deformity which so often follows the effusions associated with artificial pneumothorax is never seen. There is thus something to be said for the older forms of treatment, provided that X ray control is maintained. The disadvantages of expectant treatment are the risk that extension of disease may occur in a still functioning lung, that apparent healing and cavity closure may be followed by breakdown and reappearance of cavities, and that a longer period of confinement to bed is necessary.

The patient with a collapsed lung may be allowed liberties which are denied to those whose every movement must cause a measure of pulmonary strain. No general rules can be formulated; at every stage of the disease the individual must be considered. Social circumstance, psychological condition, family history must be taken into account as well as the nature, extent, and degree of activity of the pulmonary disease. Certain general considerations should however guide the plan of campaign. When the fibroid type, as is commonly the case, is associated with middle or later age, we have to consider whether collapse therapy is justified. Disease may become stabilised despite the persistence of a hard-walled cavity and occasional expectoration of bacilli. Tolerable health may be enjoyed for an unlimited period if the patient is able to live a quiet and sheltered life. But if collapse therapy is undertaken treatment must not be relaxed until the offending cavity is closed. If we are not prepared to complete the work it had better not be undertaken at all. The prognosis in adolescent phthisis is so grave that collapse therapy is justified directly X ray examination and sputum tests indicate that cavitation has occurred. If carried out at an early stage before adhesions have formed and when the disease is still of purely, exudative type a year—only two or three months of which need be spent in bed—may suffice to close cavities and arrest the disease. The risks of artificial pneumothorax are in most instances not comparable to the risks of extending disease, and such extension may occur with alarming rapidity in a functioning lung. In the exudative types of disease occurring in the post-adolescent years a short period of observation under X ray control is usually desirable. Disease of exudative type, unlike proliferative disease, is never static. It progresses or resolves, and serial skiagrams taken at monthly intervals are our best guide in prognosis. If resolution is occurring, if new foci do not appear, conservative treatment may be sanctioned, unless the patient's social circumstances are such as to limit the period of treatment. If resolution is delayed or there is evidence of advancing disease artificial pneumothorax should be undertaken, supplemented if necessary by section of adhesions or phrenic avulsion if cavitation persists.

These conclusions are supported by the observations of FALES and BEANDET who found that in a series of 90 cases occurring in early middle age "young or exudative cavities responded most favourably to bed-rest," 66 per cent. healed under this treatment. Of the second-degree cavities, 43 per cent. healed, while only 17 per cent. of those of the fibrotic type yielded to rest-treatment. Those who have had experience of the very satisfactory results which may be secured by a régime of rest will support their contention that half measures will not suffice; bed-rest should imply "absolute control and supervision during the entire 24 hours, with rest ranging from 21 to 24 hours in bed and absolute rest where response is slow to lesser amounts." This may seem a counsel of perfection, but it is one to which a patient who realises that his life is at stake will submit. The year of rest which may be required is less than half the period of recumbency often needed for the healing of a diseased spine or hip-joint, and it is a small price to pay for the arrest of pulmonary tuberculosis.

[1] Amer. Rev. of Tuberc., xxx., 2, 225.

ANNOTATIONS

VITAMIN B AND PERNICIOUS ANÆMIA

No one has yet discovered the exact nature of the extrinsic factor which interacts with Castle's intrinsic factor (secreted by the stomach) to form the principle which prevents or cures pernicious anæmia. It is present however in considerable quantities in meat and yeast, and the fact that all the substances that contain it are also sources of the heat-stable rat-growth-promoting fraction of water-soluble vitamin B (i.e., vitamin B_2) led Strauss and Castle [1] to suggest that the two are similar if not identical. Wills [2] subsequently published observations from which she concluded that B_2 could not be the extrinsic factor; for she found that egg-white extract previously digested with normal gastric juice was ineffective in the treatment of a single case of Addisonian pernicious anæmia. Her work has lately been criticised, however, by Miller and Rhoads [3] who maintain that the egg-white extract used was not rich in vitamin B_2 and also that it was not proved that the single case investigated would have responded to oral treatment in any form; it was assumed that because an improvement of blood values followed the injection of liver extract a similar improvement would have followed administration of the same material by mouth. Miller and Rhoads in repeating Wills's observations used freshly coagulated egg-white and found that a definite though not maximum reticulocyte response was obtained when 100 g. predigested with 150 c.cm. of normal gastric juice was given daily. Thus egg-white was a source, though not a particularly good one, of vitamin B_2, and 5 g. was found to contain one rat-growth unit of the vitamin. Rice-polishing concentrate containing one rat-growth unit of B_2 in 2 g. also produced hæmopoiesis in a daily dose of 15 g. predigested with normal gastric juice. Miller and Rhoads do not claim that B_2 and the extrinsic factor are identical, but they suggest that white of egg must be considered as a possible source of the extrinsic factor, whatever its nature; while if B_2 is the extrinsic factor it is evidently effective in small quantities.

It has been generally accepted that probably yeast owes its hæmopoietic action to its high content of extrinsic factor, rather than to the presence of the fully formed pernicious anæmia factor which is found for example in liver. Marmite is therefore thought to be effective only in those anæmias in which the extrinsic factor alone is lacking. Ungley and James [4] however find no parallelism between the vitamin-B_2 potency of yeast extracts as tested in rats and their effect upon hæmopoiesis in pernicious anæmia. They also refer to cases which show only a slight response to vitamin-B_2 concentrates specially purified by Peters and O'Brien but respond well to extracts of marmite poor in this vitamin. These observations suggest, as does the previous work of Wills, that vitamin B_2 is not the extrinsic factor—or that marmite contains some other hæmopoietic factor beside extrinsic factor. Conclusive proof of the identity or lack of identity of extrinsic factor and vitamin B_2 can only be hoped for when both substances have been isolated in pure form. The relationship of the two to a marmite hæmopoietic factor will also be clarified if the latter is isolated.

[1] Strauss, M. B., and Castle, W. B.: Jour. Amer. Med. Assoc., 1932, xcviii., 1620.
[2] Wills, L., and Naish, A.: THE LANCET, 1933, i., 1286.
[3] Miller, D. K., and Rhoads, C. P.: New Eng. Jour. Med., 1934, ccxi., 921.
[4] Ungley, C. C., and James, G. V.: Quart. Jour. Med., 1934, iii., 523.

GASTRIC ACIDITY IN RHEUMATIC CHILDREN

IN an ingenious demonstration of increased excretion of acid in the urine of rheumatic children, Dr. W. W. Payne [1] has lately provided support for the theory of an "acid diathesis" in juvenile rheumatism. The subject is approached from another angle in some observations by Dr. Jessie Ogilvie [2] on gastric secretion in this disease. She began with a careful study of 60 "healthy" children—most of them convalescent at the Sick Children's Hospital in Glasgow—and made records of the free hydrochloric acid, total acidity, total chlorine, peptic activity, and in some instances the hydrogen-ion concentration of specimens obtained by the usual fractional method of gastric analysis. She then proceeded to a similar investigation of nearly 100 rheumatic patients. All of these were afebrile and convalescent and the group included cases of chorea. The object of the inquiry was to seek possible support for the allergic theory of rheumatism; it was argued that this would be forthcoming if the rheumatic group showed an abnormal proportion of children with achlorhydria or hypochlorhydria, for deficiency in gastric acidity is reported in conditions such as asthma which are generally accepted as allergic. Actually the figures obtained did afford some support for the theory, since of the totals 12 per cent. of the rheumatic compared with 5 per cent. of the normals had lowered or absent hydrochloric acid in the test-meal fractions. Closer analysis, however, shows that the rheumatic group exhibited more variations with a larger number of extremes; indeed, if one looks for *hyper*chlorhydria one finds it in 24 per cent. of the rheumatic and only 13 per cent. of the normal children. Hence it is possible also to read the evidence as favourable to the "acid diathesis" view of rheumatism. True, the average total chlorine content of the fasting blood proved to be similar in each age-period for the two groups of children, but previous attempts to show any tendency in the blood of rheumatic children towards the acid side have mostly failed—perhaps, as Payne suggests, because the body is able to maintain a remarkably constant acid-base balance so long as its excretory organs are in working order. It remains possible that the wider variations found in Ogilvie's series and the increased urinary output of acid noted by Payne are signs of some real abnormality of acid-base metabolism which underlies the rheumatic disorders of early life.

THE MARIE CURIE HOSPITAL

THE claims of the Marie Curie Hospital to be a fitting memorial to the discoverer of radium—not a sentimental static one but a severely useful scientific instrument for the relief of patients suffering from cancer—were eloquently set out by the Prime Minister at a meeting held at 10, Downing-street, on Dec. 6th. He spoke, he said, as a layman and outsider, knowing only enough to be proud of the results achieved by the capable team of medical women controlling the hospital, and to share the conviction of the Medical Research Council and other vigilant bodies who helped with subsidies the research in progress that

[1] Arch. Dis. Childhood, August, 1934, p. 259; see THE LANCET, Oct. 27th, p. 966.
[2] Arch. Dis. Childhood, October, 1934, p. 327.

any support, moral or material, offered to the hospital would be well used. Lord Horder, as chairman of the advisory committee of the British Empire Cancer Campaign, whose duty it is to select institutions for support, added his tribute of confidence. Even before the Marie Curie Hospital was founded the campaign had made a substantial grant each year to the radium clinic, operating at four hospitals staffed by women, from which it arose in 1929, and since then the financial support and the loan of radium had been continued. The day had gone by when radium was used with reckless abandon and empiricism, except by irresponsible persons. The irradiation treatment of cancer had become an applied science which required most scrupulous attention if the best possible results were to be achieved. It might well be that the faculty of women to maintain as a routine very careful regard to detail was responsible for the fact, recorded in the latest report issued by the Medical Research Council of the results obtained in the various radium centres working under their auspices, that the percentage of cures obtained at the Marie Curie hospitals worked out considerably higher than those at any other centre.[1] Miss Louisa Martindale, M.D., the next speaker, traced the history of the hospital, describing its origin, growth, and the international reputation it has achieved amongst the clinical research centres dealing with the treatment and cure of cancer. The enlargement of the hospital and the addition to its equipment last year of a deep X ray therapy plant to supplement radium therapy where required has made the provision of increased public support an urgent problem if the work is not to be curtailed. Mr. Frederick Lonsdale and Mrs. Walter Runciman supplied further cogent reasons why such support should be forthcoming. From our knowledge of the present needs of the Marie Curie Hospital and of the development of its activities which is essential to the fruition of the work in hand, we endorse the appeal.

NERVOUS SYMPTOMS OF TAPEWORM INFECTION

THE practical importance of cysticercosis as a cause of brain disorders, particularly in persons who have resided overseas, has been amply demonstrated at the military hospital, Millbank, during the past few years. In a remarkable contribution[2] just a year ago to the Royal Society of Tropical Medicine and Hygiene Colonel W. P. MacArthur made it clear that much of what had been called idiopathic epilepsy in soldiers who had served abroad must be credited to invasion by the cysticercus of the pork tapeworm. In the October issue of the *Quarterly Journal of Medicine* H. B. F. Dixon and D. W. Smithers give an account of the clinical symptoms and course of each of 71 proved cases of cysticercosis, most of them studied at Millbank. These detailed summaries, which hold evidence of much labour, illustrate the amazing variety of the nervous manifestations caused in this disease, though in the majority of instances the presenting symptoms are those of epilepsy. The figure given in the title of this paper can represent only some small proportion of the true number of military cases of cysticercosis occurring during the period covered by the authors' survey, and, as a matter of fact, this figure has already been considerably increased during the several months since they wrote. The difficulties in diagnosing this disease—even when it is remembered and looked for—are much intensified by the fact that for practical purposes exact diagnosis is dependent on the formation of at least one superficial cyst which can be detected and excised, or by recognisable depositions of calcium in degenerated parasites, both of these being entirely fortuitous happenings, and the latter of unusual occurrence in the brain. It cannot be emphasised too strongly that a negative radiogram of the skull is of no value in excluding this disease. Accumulating military experience goes to indicate that light degrees of infestation are common and may even be the rule in cysticercosis. In many patients the number of parasites which can be detected is very small, perhaps only one or two in the whole body; in many others who from their history and symptoms are almost certainly victims of cysticercosis no parasites at all can be found. Past experience encourages the hope that the suspected diagnosis will eventually be confirmed in some considerable proportion of such cases if they can be kept under observation and re-examined as required. The group of suspects includes at present over 40 men whose radiograms, although not yet diagnostic, show appearances indistinguishable from those of cysticerci in early stages of calcification. Colonel MacArthur a year ago expressed his belief that a properly conducted search in homes for epileptics and other institutions would disclose subjects of unsuspected cysticercosis called by some other name. His prophecy has been justified by the detection of such institutional cases in countries as far apart as Burma, Rhodesia, and North America, as well as in this country.

[1] See THE LANCET, Nov. 3rd, p. 1019.
[2] THE LANCET, 1933, ii., 1431.

OWNERSHIP OF CHEAP HOUSES

IT is one of the most encouraging features of our time that the standard of living demanded for working-class households has steadily risen as the facts of the housing situation have become widely known, so that a state of things lately accepted almost without question is now regarded as intolerable. The lowest standard considered acceptable is well in advance of the average of pre-war provision, and it may be readily imagined that the building of new and better houses has had a detrimental effect on the owners of an earlier kind of working-class property. But the factor of ownership has hardly received the attention it deserves. This country is in urgent need of an increase, estimated at not less than a million, in the number of houses which can be let at a rental not exceeding 10*s.* a week, including rates. In a supplement issued with the *Daily Telegraph* of Nov. 26th, and in No. 7 of the *Phœnix*, published at about the same time, Lord Balfour of Burleigh has explained why, though the building of such houses may well be undertaken by private enterprise, their ownership should be in different hands. The actual cost of a three-bedroom non-parlour house is such that, given cheap land, rents can be fixed at a level within the reach of the lower-paid wage-earner, but only by limiting the rate of interest on capital employed for the purpose to something like 2¾ or 3 per cent.—hardly a commercial proposition. Hitherto the vast majority of low-rented houses outside the slums have been owned by local authorities, but there are drawbacks to an indefinite extension of municipal housing. It cannot be a wholesome thing in the public life, Lord Balfour of Burleigh remarks, for millions of municipal voters to be tenants of the local authority, elected members of which are dependent on their votes for return at the polls. The result would necessarily be to make rent levels and other questions of management an issue at municipal

elections. The Moyne Committee, it will be recalled, proposed to entrust public utility societies with considerable powers and responsibilities and it has yet to be seen what place will be found for them in the new Housing Bill. The work of these societies has hitherto been limited by their resources; their success has been of a kind which cannot fairly be expressed in numbers. The Rev. Nigel Scott, organiser of the St. Pancras House Improvement Society, said last year that if all the slums were banished in five years' time we should be just at the beginning of our task—and the Minister of Health has recently said much the same thing. The slum-dweller transferred to a decent home requires much education and friendly guidance in adapting himself to his new surroundings, and Octavia Hill's words in evidence before the Select Committee of 1882 are still true—"You will never reach the poor except through people who care about them." Enlightened management on Octavia Hill's lines has been carried out by public utility societies with results creditable both to themselves and their tenants. The eagerly anticipated Bill promises to put forward proposals on an unprecedented scale; it is much to be wished that public utility societies may not be overlooked in this vital aspect of ownership.

AMINO-ACID THERAPY IN MUSCULAR DISEASES

THE primary muscle dystrophies have in the past yielded little to treatment. This group of disorders, which includes the myopathies, myasthenia gravis, dystrophia myotonica, and myotonia congenita, is uncommon; but many physicians know and dread the sensation of helplessness which they arouse. There was thus abundant cause for the interest which greeted the claim of Milhorat, Techner, and Thomas [1] in 1932 that considerable improvement followed the exhibition of glycine in muscular dystrophy.

It has long been known that creatinuria is present in this group of diseases, and as long ago as 1909 Levene and Kristeller showed that increased protein intake resulted in increased creatine excretion in such cases. The older conception that creatine formation could not be increased by the feeding of proteins and amino-acids was finally exploded in 1929 by Brand, Harris, Sandberg, and Ringer, who showed that feeding with glycine caused an increase of 40 per cent. in creatine excretion. On the assumption that in muscular dystrophy the muscles were unable to fix creatine, Thomas and his colleagues treated patients with glycine in doses of 10–20 g. per diem. They found that an increase of creatinuria resulted which was followed by a decrease, this decrease being associated with sensations of "rumbling and crawling" in the affected muscles and by considerable subjective and objective improvement. During the last two years many reports have been published on the treatment of muscle diseases with glycine. The majority support the contention of the original observers that glycine is of value in myopathy. All are agreed that it is useless in muscles showing atrophy secondary to lesions of the lower motor neurone. Tripoli and Beard have used glutamic acid instead of glycine as it is cheaper, forms creatine in larger quantities in rats, and is non-toxic. They record good results in myopathy but failure in neuropathic atrophy. In a later paper, in collaboration with J. E. Andes,[2] they conclude that prognosis is good where there is an increased creatinuria with a subsequent marked decrease on amino-acid feeding, and they suggest that these changes in creatine excretion may be of value in differentiating between primary and secondary muscular atrophy. Similar favourable results have quite recently been reported by Stone and Abeles.[3] Cuthbertson and Maclachlan,[4] in a valuable and critical paper, record nine cases of myopathy treated with glycine, eight of which showed general improvement in strength and weight and some local increase in power in the affected muscles. During the past month Tripoli, McCord, and Beard [5] have again emphasised the prognostic importance of increased creatine excretion on exhibition of amino-acid. They record 34 cases treated on these lines; patients with myopathy and myasthenia gravis showed much benefit, but they also claim symptomatic improvement in some neuropathic types of myatrophy. In a debate subsequent to their communication opinions differed a good deal.

In myasthenia gravis the reports are less unanimous. W. M. Boothby [6] recorded several cases from the Mayo Clinic where improvement followed glycine therapy. But myasthenia gravis is notoriously a disease in which spontaneous remissions are frequent and render difficult the assessment of the value of treatment. D. McAlpine [7] reported a case in which improvement seemed more definite with ephedrine and glycine than with ephedrine alone, while glycine alone produced no effect. He suggested that the effect of glycine was to enhance the action of ephedrine on the sympathetic terminations. But progress was not arrested in his case and the patient died. S. K. Kostakow [8] has described improvement and increased creatinuria in a patient with dystrophia myotonica following glycine and testicular extract together, glycine alone having had no effect, and also improvement following glycine combined with acid sodium phosphate, but from neither alone in a case of Charcot-Marie-Tooth's disease.

S. Nevin's [9] work on the changes in the acid-soluble phosphorus-holding compounds in muscle at rest and during contraction offers no chemical basis for these claims. Examining specimens of muscle obtained by biopsy during rest and contraction and comparing the results with normal controls, he finds no changes from the normal in myasthenia gravis. In two cases of myopathy the total acid-soluble phosphorus and the creatine-phosphoric acid were low, and though this latter substance showed a subnormal breakdown on stimulation of the muscle, the figures were less abnormal than in a case where the myatrophy was secondary to a neural lesion. He suggests that, from these observations, the chemical changes in the muscle are secondary to the atrophy in myopathy and that it is not a condition primarily dependent upon a disturbance of creatine metabolism. By way of explanation of the clinical improvement reported in such cases he offers the suggestion that the specific dynamic action of the amino-acid stimulates muscle metabolism. The observations of Costedoat and Anjaleu [10] are of interest in connexion with the disturbance present in myasthenia gravis. These workers found that in rabbits whose muscles were rendered poor in glycogen by phlorhizination a myasthenic electrical reaction was produced and they suggest that the underlying fault in this disease may be in failure to reconvert lactic acid to glycogen.

The records of improvement in myopathy with

[1] Proc. Soc. Exper. Biol. and Med., 1932, xxix., 609.
[2] Amer. Jour. Med. Sci., November, 1934, p. 706.
[3] Jour. Nerv. and Ment. Dis., September, 1934, p. 285.
[4] Quart. Jour. of Med., 1934, n.s. iii., 411.
[5] Jour. Amer. Med. Assoc., Nov. 24th, 1934, p. 1600.
[6] Proc. Staff Meet. Mayo Clin., 1932, vii., 557; Ibid., 1932, vii., 737.
[7] THE LANCET, 1934, i., 180.
[8] Med. Klin., August 24th, 1934, p. 1127.
[9] Brain, 1934, lvii., 239.
[10] Bull. et mém. Soc. méd. hôp. de Paris, Nov. 5th, 1934, p. 1366.

glycine therapy seem to warrant a more extensive trial of this method of treatment, though it has no sound theoretical basis.

CHEYNE-STOKES BREATHING

AT the beginning of the year we referred [1] to a paper in which J. A. Greene of Iowa distinguished between two clinical types of periodic breathing, one characteristic of increased intracranial pressure and the other of cardiovascular disease. A case recorded by Garnot, Caroli, and Fiehrer of Paris [2] now suggests that the Cheyne-Stokes respiration of cardiac disease may be explained by pressure on the respiratory centres. Their patient was suffering from an attack of auricular fibrillation, accompanied by considerable œdema, and ultimately lapsed into a comatose condition with conspicuous Cheyne-Stokes breathing. Lumbar puncture revealed a considerable increase in the pressure of the cerebro-spinal fluid, and relief of this was followed by a return to consciousness and normal respiration. Garnot and his colleagues draw attention here to what may have been a fortunate coincidence—namely, the simultaneous occurence of a copious diuresis and a disappearance of œdema. They regard the abnormal respiration as due to cerebro-meningeal œdema obstructing both the venous return from the brain and the circulation of cerebro-spinal fluid, and point out that while lumbar puncture may alleviate the symptoms, only subsidence of the œdema can remove the ultimate cause of the increased intracranial pressure. The sequence of events is very clear in this case, and there is no reason to dispute the interpretation advanced. Cheyne-Stokes breathing occurs, however, not only in cerebral, renal, and cardiovascular disorders, but in the very young and very old, especially during sleep; it is also seen in hibernating animals during the winter. Another common type is that due to lack of oxygen in the inspired air and met with in mountain sickness; the conventional interpretation of this is that the increased ventilation necessary to ensure an adequate supply of oxygen washes carbon dioxide out of the alveoli, thereby removing the normal stimulus to respiration, and produces a period of apnœa which persists until the combination of oxygen-lack and mounting carbon dioxide is sufficient to initiate a further respiratory cycle. This purely chemical explanation is obviously applicable to special cases only; in most instances there exists some impairment of the respiratory centre which is at least contributory. As we pointed out before,[1] there is probably a series of respiratory centres in the brain-stem, each under the control of those above it; moreover, the lower ones show a type of periodic activity similar to that encountered in some animals, particularly aquatic mammals. The partial release of these lower centres would be highly probable in descending impairment of the central nervous system, and might well account for periodic breathing. The work of Greene and of Lian and Deparis [1] shows that in man not only the brain-stem, but the cerebrum is involved; in certain patients stimulation of the attention is sufficient to restore normal breathing. It is easy to visualise the reverse process taking place during sleep, and indeed it is doubtful if periodic breathing in this state is confined to children and the aged; those who have had the misfortune to be kept awake by the snoring of an otherwise normal person must have noticed the rhythmical waxing and waning of the sound. This may not amount to Cheyne-Stokes respiration, which is characterised by definite apnœa, but the difference may be only quantitative.

[1] THE LANCET, 1934, i., 142.
[2] Bull. et mém. Soc. méd. hôp. de Paris, Oct. 29th, 1934, p. 1313.

A PARIS TRANSPLANT

THE former fortified zone embracing Paris has, since the war, been given over to a vast experiment in housing. The architects of the Habitations à Bon Marché (H.B.M.) financed by the municipality have built upwards rather than sideways, their creations running to six or eight storeys in imposing blocks. Early in 1933 they housed over 74,000 persons, 36,000 of whom were children under 16, and 12,000 adolescents between 16 and 20. Although these buildings have been supplemented by parks for children, under the supervision of trained welfare workers, it was feared in some quarters that the density of population created by this system of architecture might favour the spread of infectious diseases. Fortunately a voluntary organisation had been started in 1925 to provide these buildings with a medico-social service staffed by trained social workers. The statistical information provided by this service shows that the general mortality of the H.B.M. was only 78 per 10,000 inhabitants in 1933, against 150 for the whole of France. Pulmonary tuberculosis was however responsible for 19 per cent. of all the deaths in these quarters in 1933, the corresponding figure for the whole of Paris being 12 per cent.; the disparity reflects the low general mortality in these quarters and the high proportion of juvenile population. It is important to note that the tuberculosis mortality has been falling since 1930 faster in the H.B.M. than in the rest of Paris; the deaths per 100,000 inhabitants were as follows:—

	1930.	1931.	1932.	1933.
Paris	195	187	170	156
H.B.M.	238	191	176	155

From a survey of these and other figures [1] Dr. Y. de Hurtado draws the conclusion that much of the tuberculosis recognised as such in the H.B.M. is their heritage from the slums whence their tenants were recruited. To the sunny, airy, and otherwise sanitary buildings is due the credit for its rapid decrease.

[1] Rev. de Phtisiol., Sept.–Oct., 1934, p. 671.

A MEDICAL LIBRARIAN

THE death on Dec. 4th of Mr. Hubert E. Powell, F.S.A., librarian of the Royal Society of Medicine, was announced in our last issue. Mr. Powell had been 27 years in the service of the Society, first as assistant and from 1920 as chief librarian. During his term of office the library increased to an extent which made it the largest of its kind in the British Empire, and it offers facilities for study not yet reached by other medical libraries. In all this progress Mr. Powell played a prominent part. His knowledge of medical bibliography was comprehensive and accurate and at all times it was placed ungrudgingly at the disposal of every reader. In the preparation of many medical works for the press his hand can easily be traced, and there must be hundreds of doctors who first learned from him the importance of accuracy in medical bibliographies. Mr. Powell may truly be said to have lived for the R.S.M. library and its development will long remain a monument to his care and efficiency.

AT a meeting on Dec. 11th the Prince of Wales, as president of King Edward's Hospital Fund for London, announced that for the third year in succession the "ordinary distribution" of the Fund was being maintained at £300,000, and with £20,000 in special grants towards the pensions scheme the total to be distributed was £320,000.

PROGNOSIS

A Series of Signed Articles contributed by invitation

XXXI.—PROGNOSIS IN PRIMARY GLAUCOMA

PRIMARY glaucoma is a disease with an ætiology which is still obscure. It is diagnosed by the presence of the known symptoms and signs of increased tension and has to be distinguished from secondary glaucoma, in which the tension is raised by some definite ocular disease. We are not here concerned with diagnosis, but with prognosis, and for this purpose it is necessary to consider the various clinical types—viz., (1) the fulminating type, (2) the recurring congestive type, (3) the chronic form with congestive attacks, (4) the chronic simple or non-congestive type. At one end of the scale is the severe congestive fulminating form which may end in blindness in a few days, and at the other the simple chronic glaucoma, which comes on insidiously with no congestion, no pupil changes, and often with very little increase of tension.

Predisposing Factors

Age.—Primary glaucoma affects people who are getting on in years. It is most common after 50, but is occasionally met with in the early thirties, and cases have been recorded in the twenties. The greater frequency of the disease in elderly people and its progressive tendency is explicable by local causes, as shown by Priestley Smith. The chief of these is the increasing circumference of the lens throughout life, with narrowing of the circumlental zone, so that swelling of the vitreous or increase of pressure there cannot be relieved readily by traffic of fluid forward from this structure.

Sex.—Women are affected more commonly than men in the congestive cases, but the sexes are equally involved in chronic glaucoma. This frequency in women is probably associated with their more highly strung temperament, for there is undoubtedly a vasomotor factor present in the ætiology of the congestive type and possibly in the chronic type as well.

General Factors.—Theoretically and experimentally vasodilatation of capillaries in the eye produces an increase in intra-ocular pressure, and clinically excitement is often a factor in producing an attack. Many such instances could be cited, such as mental excitement in political discussion, nervousness in anticipation of an operation, the operation itself, or an operation for glaucoma on the other eye. These all point to a vasomotor cause of glaucoma, and it is thought that some histamine-like substance may be a factor in determining vasodilatation in the ciliary and choroidal areas. It follows from this that patients with glaucoma should be instructed to lead quiet healthy lives and to limit the use of their eyes as far as possible, and that response to this advice must be taken into consideration when thinking over the prognosis. There is no evidence proving that hyperpiesis is a factor in producing glaucoma.

Dilatation of pupil.—There is a healthy fear in many practitioners that the use of a mydriatic in a patient over 40 years of age is contra-indicated for fear of glaucoma. An attack is occasionally, but very rarely, produced thereby, and it is very unlikely that such an attack will be induced, except in an eye which is the subject of glaucoma or which is predisposed to glaucoma. Apart from actual glaucoma, the dilatation produced by cocaine or homatropine can be readily counteracted by one drop of eserine. The mydriasis produced by atropine, however, cannot be counteracted for some time, and, where glaucoma is present, a congestive attack may be induced which will yield to nothing short of operation.

Progress in Untreated Cases

Glaucoma, once commenced, tends to progress; congestive attacks recur and pass over into Group 3 (see above) and the chronic cases gradually increase in severity. As a general statement one may say that untreated glaucoma passes on to absolute glaucoma in which the eye is hard and sightless, the pupil dilated, the episcleral vessels distended, and the disc deeply cupped. This final stage is reached after a period which necessarily varies with the type of the disease. The first attack of a fulminating glaucoma may produce it in a week or even in a day. Recurring congestive attacks may occur every few months or at weekly intervals, and may pass over into chronic and then absolute glaucoma in a few years or months. Chronic glaucoma with congestive attacks may bring loss of vision in a similar period, but chronic simple glaucoma may make very slow progress indeed, coming on so insidiously that the patient is unaware of the increasing loss of field until it is, perhaps, reduced to central vision only after 10 or 15 years.

Reaction to Treatment

It is necessary to consider separately the prognosis of the various groups in response to treatment.

ACUTE FULMINATION

The acute fulminating type calls for correct treatment as a matter of urgency. This treatment will aim at the contraction of the pupil by means of eserine and cocaine drops, applied at first half-hourly (eserine sulphate 1 per cent., cocaine HCl 2 per cent.), leeches to the temple, rest in bed, hot applications, and free purgation with salines. If after a few hours the pupil commences to contract the intra-ocular tension will be found to be decreasing, and the attack will pass off with gradual return of useful vision, but with some permanent impairment.

If on the other hand these measures are unsuccessful in reducing tension, operation becomes a necessity. Twenty-four to forty-eight hours of really high tension may be enough to damage the visual function of the retina beyond recall. If skilled hands are available, an iridectomy or corneo-scleral trephine operation will be performed, according to the predilection of the surgeon. A large proportion of such cases do well and regain good visual acuity, but a certain number react badly to operation, and so the prognosis must always be a guarded one. If skilled help is unavailable and the tension remains high for more than 24 hours, the tension may be reduced by a posterior sclerotomy as a temporary measure. In this operation the sclerotic is punctured by a Graefe knife through the ciliary body at a point 6·5 or 7 mm. from the corneo-scleral margin; before withdrawing the knife it is rotated through 90 degrees to permit escape of vitreous. This operation would appear to be a safe one; it seldom causes any hæmorrhage into the vitreous and does not cause retinal detachment, as might be feared. Unfortunately the resulting decrease of tension is only a transient one but the operation can be repeated. Some surgeons use it also as a preliminary to iridectomy. This sometimes has the advantage, after a few minutes' wait, of a

clearing of the hazy cornea and a deepening of the very shallow anterior chamber; both of these factors will facilitate the making of the section for a glaucoma iridectomy. The advantage is, however, arguable. The soft globe may make the section difficult, but when the globe is hard, the sudden relief of pressure may cause subluxation of the lens towards the wound, and the formation of cataract.

RECURRING CONGESTIVE

Milder recurring attacks of congestive glaucoma yield to similar therapeutic measures, but the tendency to glaucoma is present and will get worse as time goes on, so that there will always be a danger of a more serious attack with permanent damage to vision. In such cases several recurrences will compel the surgeon to advise an operation for the formation of a safety-valve from the anterior chamber into the sub-conjunctival space (e.g., corneo-scleral trephining). On the whole the results of operation in such cases are good and the attacks of congestion cease. Some schools of ophthalmology prefer iridencleisis or cyclodialysis as their procedure for this type of case.

CHRONIC WITH CONGESTIVE ATTACKS

The commonest type is the gradually progressive form of glaucoma with increase of tension, cupped disc, and loss of visual field, combined with occasional exacerbations of tension. Such cases have a progressive course and are not controlled by eserine; if neglected they go on to blindness. Trephining or some such operation is indicated, and the results vary very much. Mostly the results for permanent relief of tension are excellent, but in a number of cases the tension returns and further operation is indicated, which may again be unsuccessful. Where the relief of tension is permanent the vision will not deteriorate further, but will not improve. Occasionally, although the tension appears to have been relieved satisfactorily, the deterioration of vision still goes on. The usual explanation of such cases is that an optic atrophy has been started by the glaucomatous process and has continued although the tension has been relieved. It is more probable that the tension has not been reduced to normal or that it passes above normal from time to time.

When the loss of visual field encroaches close up to the macula operation occasionally causes loss of macula vision. This is scarcely ever seen after the operation of sclero-corneal trephining, but was more common in the days when iridectomy was the operation of choice.

CHRONIC SIMPLE

The chronic simple glaucoma without more than a suspicion of tension is controlled by miotic drugs for a time, and in some cases for many years. In such cases one will watch the fields of vision and will only advise operation when they are becoming diminished in area. In my experience such cases do well with operation, but I know that all ophthalmic surgeons do not agree with me on that point.

Conclusion

Finally we must remember that an eye with glaucoma is a sick eye and that a certain proportion of such eyes (though a small proportion) resent operative interference. On the whole, the less damaged the eye, the better it will stand operation, and therefore surgery should not be postponed too long. Any intra-ocular operation is beset with some risk, and the age and general condition of the patient must be taken into account, together with the condition of the eye, before arriving at a considered judgment in any given case.

FRANK JULER, F.R.C.S.,
Surgeon, Royal London Ophthalmic Hospital, and Ophthalmic Surgeon, St. Mary's and Queen Charlotte's Hospitals.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Capts. J. G. Danson to *Victory* for R.N.B.; F. L. Smith, O.B.E., to *Pembroke* for R.M. Infirmary, Deal; and G. R. McCowen to *Nelson*, as F.M.O. on staff of Commander-in-Chief, and as Specialist in Hygiene, on recommg.

Surg. Comdrs. N. B. de M. Greenstreet to *Drake* for R.N.B.; G. E. D. Ellis, O.B.E., to *Titania*; L. S. Goss, O.B.E., to *Drake* for R.M. Infirmary, Plymouth; F. E. Fitzmaurice to *Britannia*; L. F. Strugnell to *Pembroke* for R.N.B.; and K. A. I. Mackenzie to *Resolution*.

Surg. Lt.-Comdr. W. V. Beach to *Dragon*.

Surg. Lt.-Comdr. (D.) D. G. Eglinton to *Vernon*.

Surg. Lt. (D.) A. W. Y. Price to *Drake* for R.N.B.

ROYAL NAVAL VOLUNTEER RESERVE

P. de B. Turtle and R. F. B. Bennett entered as Proby. Surg. Sub-Lts. and attached to list 2 of the London Division.

ROYAL ARMY MEDICAL SERVICE

Col. B. H. V. Dunbar, D.S.O., M.D., late R.A.M.C., retires on ret. pay.

Lt.-Col. W. F. M. Loughnan, from R.A.M.C., to be Col.

ROYAL ARMY MEDICAL CORPS

Maj. J. C. Sproule, O.B.E., to be Lt.-Col.

TERRITORIAL ARMY

Capt. J. R. Robertson is secd. under para. 135 T.A. Regs.

Lt. J. W. Laird to be Capt.

B. C. Jennings and E. C. Murphy to be Lts.

TERRITORIAL ARMY RESERVE OF OFFICERS

Capt. J. Lamberton having attained the age limit retires and retains his rank, with permission to wear the prescribed uniform.

ROYAL AIR FORCE

Flying Offr. H. Bannerman to R.A.F. General Hospital, Palestine and Transjordan.

INDIAN MEDICAL SERVICE

The undermentioned officers have vacated appts. in India:—

A.D.H. & P.—Lt.-Col. F. R. Coppinger, O.B.E., R.A.M.C.

D.A.D.P.—Capt. T. C. Puri, I.M.S.

The undermentioned appts. have been made in India:—

A.D.H. & P.—Maj. J. A. Manifold, D.S.O., M.B., R.A.M.C.

D.A.D.P.—Capt. M. K. Afridi, I.M.S.

COLONIAL MEDICAL SERVICE

The following appointments have been made: Dr. J. C. St. G. Earl becomes Senior Health Officer, Uganda; Dr. A. R. Lester, Senior Medical Officer, Uganda; Dr. H. M. O. Lester, Director of Tsetse Investigation, Nigeria; and Dr. E. A. Neff, Senior Medical Officer, Cyprus.

A RESEARCH BED.—On Dec. 6th Princess Arthur of Connaught unveiled at Charing Cross Hospital a bed which Lord Wakefield has endowed. It will be known as the "Wakefield research bed" and has been set aside for work on endocrine glands which is being carried out by Mr. L. R. Broster, surgeon to the hospital.

SPECIAL ARTICLES

ACTIVE IMMUNISATION AGAINST SCARLET FEVER

By W. T. Benson, M.D., F.R.C.P. Edin.

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LATE SENIOR ASSISTANT MEDICAL OFFICER TO THE HOSPITAL

THIS paper records the results of active immunisation of probationer nurses in the City Fever Hospital against scarlet fever over a period of nine years. The value of this method of prophylaxis and incidentally of the reliability of the Dick test is demonstrated. After a series of comparatively lean years the exceptional prevalence of scarlet fever in Edinburgh during 1933 afforded a severe test of the protective measures applied to the nursing staff.

The ordinary commercial preparations of "Dick Toxin," "Dick Control" and Scarlet Fever Prophylactic A and C issued by Messrs. Burroughs and Wellcome have been employed throughout this investigation. It would now be advantageous to increase the toxin content of the commercial scarlet fever prophylactic from 2500 and 20,000 skin-test doses per c.cm. to 5000 and 50,000 skin-test doses per c.cm. respectively.

RELIABILITY OF THE DICK TEST

We have noted the subsequent development of scarlet fever in 5 out of 1063 natural Dick-negative reactors (including 417 probationer nurses) who had been intimately exposed to the disease. On the other hand, 52 out of 363 Dick-positive reactors have within our experience contracted scarlet fever, although less exposed to infection.

The Dicks (1934) record complete freedom from scarlet fever in some 24,000 naturally Dick-negative individuals, and, what is perhaps more striking, in 4000 Dick-negative pupil nurses and interns on duty in contagious wards. Complete freedom from scarlet fever in small groups of naturally Dick-negative reactors is recorded by Hektoen and Johnson (1934), Faulds (1933), Nishibori (1932), Peacock, Werner, and Colwell (1932), and Rhoads (1931). Our experience is more in accord with that of Jacobsohn, Jundell, and Lönberg (1929), Knights (1929), Sparrow (1928), and Toyada (1927), who have all observed the somewhat rare occurrence of scarlet fever in Dick-negative reactors. Toyada noted that 25 out of 6270 Dick-negative reactors subsequently contracted scarlet fever.

The possibilities of error in the application and reading of the test are such that occasional discrepancies are to be expected. The anomalies of the Dick reaction have been carefully studied in the wards of this hospital by McGibbon (1934). He concluded that the test afforded for all practical purposes a reliable index of immunity to scarlet fever.

DICK TEST RESULTS

The Dick test has been applied on entry to 645 probationer nurses; 228 (35·3 per cent.) were Dick-positive. With an annual entry of 61 to 76 probationers, the Dick-positive percentage in successive years from 1928 to 1933 was 46, 26, 24, 35, 43, and 51. This may be a chance variation arising from the small numbers involved, yet the increasing proportion of susceptible entrants during the past three years may have some bearing on immunising problems which coincided with this period.

METHOD OF IMMUNISATION

Dick and Dick (1934) advise five subcutaneous immunising injections at weekly intervals, commencing with 500 skin-test doses and increasing to a final injection of 80,000 to 100,000 skin-test doses of toxin—the Dick retest to be applied two weeks after the last dose. They state that such a course will immunise successfully 95 per cent. of susceptibles and lessen susceptibility in the remainder. If the Dick retest be positive the final injection should be repeated. Rhoads (1931) has immunised 298 nurses at the Cook County Hospital, Chicago; the protective course amounted to 115,500 skin-test doses of toxin. Two weeks after the final injection of 80,000 skin-test doses 81·4 per cent. of the nurses were Dick-negative.

In Britain the immunising course generally employed has not so far exceeded 30,000 skin-test doses of toxin, Frazer (1932), Faulds (1933), Stallybrass (1931). After experimenting with varying dosage, Benson (1928) found that the administration of a minimum course of 26,000 skin-test doses of toxin in three or four injections rapidly gave rise to an effective immunity against scarlet fever. This course was employed in the routine immunisation of probationer nurses in the City Hospital with considerable success. By 1931 the immunity response had become so unsatisfactory that the course was increased to 36,000–52,000 skin-test doses of toxin. The primary immunising course employed at various stages of the investigation is detailed in Table I.

TABLE I

Primary Immunising Course

Year.	Size of Dick reaction.	Day of administration.					Total dose of scarlatinal toxin in multiples of skin-test dose.
		1st.	8th.	15th.	22nd.	29th.	
	mm.						
1928–1930	< 25	1,000	—	5,000	—	20,000	26,000
	> 25	500	1,000	5,000	—	20,000	26,500
1931–1933	< 25	1,000	—	5,000	—	30,000	36,000
	> 25	500	2,000	5,000	—	30,000	37,500
				or		or	or
				10,000		40,000	52,500
1934	< 25	1,000	5,000	25,000	50,000	—	81,000
	> 25	500	2,000	5,000	25,000	50,000	82,500

The primary course now administered consists of four or five injections at weekly intervals amounting in all to some 80,000 skin-test doses of toxin. The retest is applied two weeks after the final injection and, if positive, another 50,000 skin-test doses of toxin are injected. A retest is again applied fourteen days later. The attempt to immunise ceases when approximately 130,000 skin-test doses of toxin have been administered. The present course approximates to the 100,000 skin-test doses of toxin stated by Park and Schroeder (1928) to be necessary for the production of a prolonged immunity.

SYSTEMIC REACTIONS

The scarlet fever prophylactic up to 5000 skin-test doses has been mixed with the diphtheria prophylactic immediately prior to injection. Whilst this procedure invalidated the collection of accurate data the following details of reactions arising from prophylactic injections are of interest.

Fourteen (10 per cent.) out of a total of 143 completely immunised nurses suffered from well-marked constitutional

symptoms following one or other of the immunising injections. During six years (1928 to 1933) 25 nursing days were lost owing to reactions.

Five nurses were off duty (eight days in all) following injections of scarlet fever prophylactic; the responsible dose in four cases was 500, 1200, 50,000, and 60,000 skin-test doses of toxin respectively. In the fifth case a reaction followed the final injection of a preparation of experimental toxin (Parke, Davis and Co.).

Six nurses suffered from more or less severe constitutional symptoms (12 days off duty in all) following the injection of 1 c.cm. of diphtheria prophylactic (toxoid-antitoxin mixture) plus either 500, 1000, or 5000 skin-test doses of scarlatinal toxin. Three nurses who received an injection of 1 c.cm. diphtheria prophylactic (T.A.M.) plus 1 c.cm. scarlatinal toxoid suffered from sharp reactions (five days off duty). It is not possible to assess the relative part played by each constituent.

According to the Dicks (1934) some 10 per cent. of systemic reactions may be expected to follow one or other of the protective injections even if the immunising dosage is reasonably graded. Rhoads (1931) records that the reactions arising from immunising injections against scarlet fever in 190 nurses resulted in 45·5 days' loss of duty. It is to be noted, however, that the total dosage employed by Rhoads was approximately two to three times larger than ours. Peacock, Werner, and Colwell (1932) met with severe reactions in 15 per cent. of immunised members of a hospital staff.

The following is a description of a severe reaction which followed a final injection of 50,000 skin-test doses of toxin administered to a house physician. He had received three prior injections of 500, 1000, and 5000 skin-test doses of toxin, the first and third of which caused mild systemic disturbance.

At 9.30 A.M. 50,000 skin-test doses of toxin were injected intramuscularly. About 12 midday he felt ill and vomited. Between 12 midday and 3 P.M. he suffered from nausea and vomiting (12 vomits), choleraic diarrhœa, severe intestinal colic, and cramps in the calf muscles. The temperature rose, accompanied by two rigors, and pulse-rate was 140 per minute. The face was flushed, the conjunctivæ injected, and a generalised scarlatiniform rash was present by 2 P.M. Fauces and palate were reddened, but no sore-throat. He felt very prostrated. The following day he was much better, except for general soreness and loss of appetite. Apart from lassitude, recovery was complete within 48 hours.

DEVELOPMENT OF IMMUNITY

A total of 212 nurses have been immunised against scarlet fever. The first two years' results have already been published, Benson (1928), but may perhaps be briefly recapitulated. Whereas only 56 per cent. of a group of 41 nurses who received a course of 10,000 to 16,000 skin-test doses of toxin became Dick-negative within two weeks of the final injection, 32 nurses who received 26,000 to 66,000 skin-test doses of toxin developed immunity within this period of time. The results obtained from 1928 onwards are summarised in Table II.

The arresting feature in this Table is not only the diminishing response to the immunising course, particularly apparent in the last two years, but that this diminution should have occurred in spite of an increase in the immunising dosage. We do not understand why this change has arisen. The simplest explanation would be to postulate some variation in the test or immunising toxin. It may be due to a lower basic immunity of the entrants as indicated not only by the steadily increasing percentage of Dick-positive reactors but also by an increase in brilliant reactors since 1931.

Particulars of the second and third immunising courses (one or two injections) administered to persistent Dick-positive reactors are appended in Table III.

TABLE II

Development of Immunity after Primary Immunising Course

Year.	Number of nurses immunised.	Immunising course.		Dick-negative within—		Dick-positive 4 weeks after final inj.
		26,000 s.t.d.	36,000 to 46,000 s.t.d.	2 weeks of final inj.	4 weeks of final inj.	
1928	28	28	0	20 (71 %)	27 (96 %)	1
1929	10*	10	0	7 (87 %)	7 (87 %)	1
1930	18	18	0	7 (40 %)	15 (83 %)	3
1931	16	1	15	6 (38 %)	12 (75 %)	4
1932	25	0	25	7 (28 %)	15 (56 %)	10
1933	34*	0	34	15 (47 %)	17 (53 %)	15

* Two nurses left hospital before retest. inj.=injection.

TABLE III

Development of Immunity after Second and Third Immunising Courses

Year.	Dick-positive four weeks after primary course.	Second immunising course.	Dick-negative within—		Dick-positive at four weeks.	Third immunising course.	Dick-negative	Dick-positive
			Two weeks of final inj.	Four weeks of final inj.			At four weeks.	
1928	1	25,000	1	—	0	—	—	—
1929	1	30,000	1	—	0	—	—	—
1930	3	25–35,000	2	3	0	—	—	—
1931	4	30–40,000	1	3	1	60,000	—	1
1932	10*	36–40,000	6	6	—	—	—	—
1933	15*	30–60,000	8	8	3	60,000	3	—

Each immunising course is expressed in multiples of the skin-test dose of toxin.
* Four nurses left hospital before retest.

From this Table it will be noted that 34 nurses required the primary immunising course of 26,000 to 46,000 skin-test doses supplemented by further doses of toxin. The total dose of toxin (primary plus supplementary course) administered to these nurses varied from 50,000–56,000 skin-test doses in 5 to 70,000–106,000 in 29 cases.

One nurse who received in all 103,500 skin-test doses of toxin was still Dick-positive (16 × 20 mm.) at retest four weeks later. There was no pseudo-reaction. Her original very brilliant Dick-reaction which measured 30 × 30 mm. in diameter had, however, markedly diminished in size and intensity. The attempt to immunise this nurse to Dick-negative was abandoned.

During 1929 four nurses (not included in Table II.) were immunised with an experimental toxin kindly supplied by Messrs. Parke, Davis and Co. Three developed immunity within 14 days of completion of a course of five weekly subcutaneous injections; one was still Dick-positive at four weeks. No systemic reactions were noted.

DURATION OF IMMUNITY

Forty-six successfully immunised nurses, the majority of whom had received 36,000–80,000 skin-test doses of toxin, were retested two and a half years later; 44 were still immune, but 2 nurses who had been immunised with 26,500 and 30,500 skin-test doses of toxin respectively gave a positive Dick retest.

Dick and Dick (1934) state that retests performed at varying intervals up to six years in successfully

immunised individuals showed that only 5 to 9 per cent. had reverted to a susceptible state. The same authorities are of the opinion that the duration of active immunity depends on the amount of toxin injected. Benson (1927) concluded that active immunity can be attained by the injection of relatively small doses of toxin, but that large doses are required for the production of a lasting immunity. It is hoped that the important relationship between dosage and duration

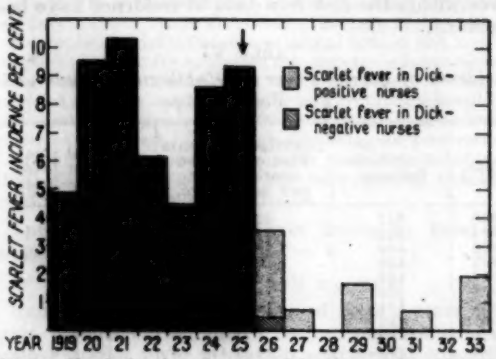
SCARLET FEVER INCIDENCE PER CENT.
Scarlet fever in Dick-positive nurses
Scarlet fever in Dick-negative nurses
YEAR 1919 20 21 22 23 24 25 26 27 28 29 30 31 32 33

FIG. 1.—Chart showing the annual incidence of scarlet fever among the nursing staff, 1919–1933. Active immunisation began in 1925 and after that year the columns are stippled or hatched according to whether the nurses who contracted the disease were Dick-positive or Dick-negative.

of immunity is fully appreciated by those administrators who may be contemplating the application of this prophylactic method to the general community.

INCIDENCE OF SCARLET FEVER

The annual incidence of scarlet fever and tonsillitis in the probationer nursing staff since 1919 is shown in Table IV.

TABLE IV

Incidence of Scarlet Fever and Tonsillitis among the Nursing Staff

Year.	Average weekly probationer staff.	Scarlet fever in staff and incidence per cent.	Tonsillitis in staff and incidence per cent.	Number of true scarlet fever patients admitted.
1919	145	7 (4·8)	27 (18·6)	1435
1920	148	14 (9·5)	22 (15·0)	1374
1921	146	15 (10·3)	32 (21·9)	1983
1922	147	9 (6·1)	44 (30·0)	1560
1923	137	6 (4·4)	28 (20·4)	1741
1924	128	11 (8·6)	35 (27·3)	1604
1925	161	15 (9·3)	36 (22·3)	1906
1926	153	5 (3·5)	27 (17·6)	1502
1927	148	1 (0·7)	18 (12·7)	1578
1928	128	0 (0·0)	14 (11·0)	823
1929	125	2 (1·6)	35 (28·0)	938
1930	138	0 (0·0)	14 (10·1)	1058
1931	148	1 (0·7)	23 (15·5)	564
1932	162	0 (0·0)	25 (15·0)	961
1933	155	3 (1·9)	35 (22·6)	3461

Active immunisation commenced in October, 1925. During 1926 the method was still in an experimental stage. So far during 1934 there has not been a case of scarlet fever.

Whilst active immunisation was commenced in October, 1925, the results obtained in the year 1926 will be omitted as the method was then in an experimental stage. Seventy-seven nurses contracted scarlet fever during the seven pre-immunisation years, 1919 to 1925 inclusive. Seven nurses contracted scarlet fever during the seven post-immunisation years, 1927 to 1933 inclusive—a reduction of 91 per cent. in the incidence of the disease.

Particulars of the seven nurses who developed scarlet fever during the seven years 1927–1933 are appended.

CASE 1.—Year 1927. A strongly Dick-positive nurse who developed scarlet fever on her third day in hospital; two days after the application of the test.

CASE 2.—Year 1929. Contracted scarlet fever within one week of entering hospital and prior to the application of the Dick test.

CASE 3.—Year 1929. Dick test on entering hospital on March 16th, 1929, doubtful negative. Developed typical scarlet fever on May 12th, 1929. Dick test repeated

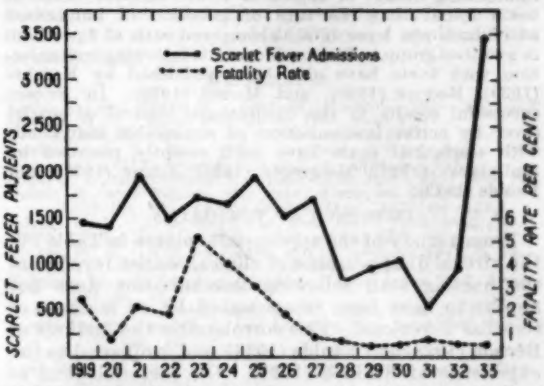
Scarlet Fever Admissions
Fatality Rate
SCARLET FEVER PATIENTS
FATALITY RATE PER CENT.
1919 20 21 22 23 24 25 26 27 28 29 30 31 32 33

FIG. 2.—Chart showing (1) the annual number of scarlet fever patients admitted to the hospital; and (2) the fatality-rate among them.

second day of disease gave a faint but definite positive reaction.

CASE 4.—Year 1931. Dick-positive on entry on Oct. 16th, 1930. Immunised 30,500 skin-test doses of toxin. Dick-negative Dec. 10th, 1930. Developed typical mild scarlet fever Jan. 27th, 1931—Schultz-Charlton blanching. No haemolytic streptococci obtained from single throat culture (human blood-agar plates). Patient's own serum withdrawn during fourth week convalescence did not produce blanching in typical scarlet fever rash in 0·5 c.cm. dose. Control with 0·2 c.cm. commercial scarlet fever antitoxin diluted 1 in 10 gave typical blanching. Two Dick tests applied on the second day of disease; test performed on forearm negative; test performed on upper arm *faint but definite positive*.

CASE 5.—Year 1933. Dick-positive on entry July 17th, 1933. Developed scarlet fever August 9th, 1933, during immunisation.

CASE 6.—Year 1933. Developed scarlet fever within fourteen days of entering hospital. Dick test had not been applied.

CASE 7.—Year 1933. Dick-positive on admission to hospital on Dec. 16th, 1930. Immunised 26,700 skin-test doses of toxin. Dick-negative March 16th, 1931. Developed an exceedingly mild attack of scarlet fever (Schultz-Charlton blanching, &c.) two and a half years later (Oct. 10th, 1933). No temperature when she reported sick on third day owing to faint rash. Dick test on Oct. 12th, 1933, faint but definite positive. Apparently slight loss of immunity after two and a half years.

Summarising these seven cases we note the development of scarlet fever in: (*a*) two nurses prior to Dick testing; (*b*) two Dick-positive nurses prior to or during immunisation; (*c*) two nurses erroneously regarded as Dick-negative; and in (*d*) one nurse who had apparently after two and a half years partially lost her artificially produced immunity.

The diminished incidence of scarlet fever following immunisation is strikingly apparent in Fig. 1. A careful study of Fig. 2 along with Fig. 1 justifies the conclusion that the diminished incidence of scarlet fever is a direct result of immunisation.

The Dicks (1934) record that no case of scarlet fever has occurred among 12,584 immunised individuals in institutions where scarlet fever was

epidemic. Of 3000 susceptible nurses and interns immunised before commencing duties in contagious hospitals not one subsequently contracted scarlet fever, whereas 37 cases of the disease occurred among non-immunised members of the hospital staffs.

Smythe and Nesbit (1928) give details of the active immunisation of over 3500 children in Indiana resulting in a materially lessened incidence of scarlet fever among the immunised. Toyada and co-workers (1930) employing an immunising dosage of 25,000 to 40,000 skin-test doses of toxin found that the rate of infection in immunised individuals was 1 per 1000 as compared with 43·3 per 1000 in a control group. Favourable results following immunisation with toxin have also been published by Knights (1929), Radoyé (1930), and Mersol (1929). In Britain successful results in the institutional control of scarlet fever by active immunisation of susceptible individuals with scarlatinal toxin have been recently recorded by Stallybrass (1931), Macgregor (1931), Edgar (1932), and Faulds (1933).

INCIDENCE OF TONSILLITIS

From a study of the appropriate column in Table IV. the virtual disappearance of clinical scarlet fever from the nursing staff following immunisation does not appear to have been compensated by an increase of tonsillar infections. This corroborates the findings of Benson (1928) and Faulds (1933), and is opposed to the experience of Kinloch (1927). On bacteriological as well as on clinical grounds 25 of the 35 cases of tonsillitis recorded during the year 1933 were considered to be due to infection with the hæmolytic streptococcus. Four of these infections, occurring as they did in Dick-positive reactors, may presumably be ruled out as masked scarlatinal infections. The remaining 21 cases were distributed as follows: 13 in naturally Dick-negative nurses and 8 (38 per cent.) in successfully immunised originally Dick-positive reactors. As the proportion of susceptible entrants during the years 1931 to 1933 who were subsequently immunised amounted to 42 per cent. of the total entrants, the distribution of hæmolytic streptococcal faucial infections suggests that the artificially immunised nurse is no more liable to suffer from a "scarlatinal tonsillitis" than her naturally immune neighbour.

Table V. shows the scarlet fever plus tonsillitis incidence in the nursing staff during the three years of maximum prevalence of scarlet fever in the general community.

TABLE V

Incidence of Scarlet Fever plus Tonsillitis in Nursing Staff

Immunity of staff.	Year.	True scarlet fever cases admitted to hosp.	Nursing staff (weekly av.).	Scarlet fever. (Cases in nursing staff.)	Tonsillitis. (Cases in nursing staff.)	Scarlet fever plus tonsillitis.
Not immunised	1921	1983	146	15	32	47 (32·3%)
	1925	1906	161	15	36	51 (31·6%)
Immunised	1933	3461	155	3	35	38 (24·5%)

For the seven pre-immunisation years, 1919–1925, the combined incidence of scarlet fever and tonsillitis in the nursing staff amounted to 301 cases, an average of 43 each year. For the seven post-immunisation years, 1927–1933, the corresponding figures were 171 and 24 respectively.

DOES AN IMMUNISED STAFF INCREASE THE RISK OF CONVEYANCE OF INFECTION TO NON-SCARLATINAL PATIENTS?

In an immunised nursing staff recognisable scarlet fever may be replaced by a highly infective localised faucial infection or by the carrier state. Dick-negative nurses suffering from a tonsillo-pharyngeal infection suspected to be due to the specific (?) hæmolytic streptococcus have invariably been returned to duty in scarlatinal wards.

The number of diphtheria patients under ten years of age who have contracted scarlet fever in hospital during each of the past fourteen years has been ascertained (Table VI.). Cases that developed scarlet fever within the first five days of residence have been excluded.

TABLE VI

Incidence of Scarlet Fever in Diphtheria Patients under Ten Years of Age

Year.	Diphtheria patients.	Diphtheria patients who contracted scarlet fever and percentage.	Total true scarlet fever admissions.
1920	617	23 (3·7)	1374
1921	546	17 (3·1)	1983
1922	419	12 (2·9)	1560
1923	436	16 (3·7)	1741
1924	449	12 (2·7)	1604
1925	545	25 (4·6)	1906
1926	374	19 (5·0)	1502
1927	442	4 (0·9)	1578
1928	389	4 (1·0)	823
1929	838	12 (1·4)	938
1930	750	16 (2·1)	1058
1931	588	13 (2·2)	564
1932	406	8 (2·0)	961
1933	347	9 (2·6)	3461

During the latter half of the year 1933 the hospital was inundated with scarlet fever to an extent never previously known, yet only 5 out of each 200 diphtheria patients under ten years of age contracted the infection whilst in hospital; an incidence of scarlet fever cross-infection actually less than that of any of the pre-immunisation years. One could not imagine more favourable conditions for the conveyance of infection by an immunised staff.

SCARLATINAL TOXOID

We are indebted to Dr. R.A. O'Brien for a preparation of scarlatinal toxoid (formalinised toxin); the potency of the toxin of origin was approximately 250,000 skin-test doses per cubic centimetre. The primary immunising course consisted of three injections each of 1 c.cm. at weekly intervals. This course was administered to eight nurses (cases not included in Table II.).

In five nurses no systemic disturbance followed the injections. Three nurses who received a combined injection of scarlatinal toxoid plus 1 c.cm. diphtheria toxoid-antitoxin mixture developed sharp reactions. Three nurses gave a Dick-negative reaction fourteen days after completion of the primary course of 3 c.cm., whilst five were still strongly Dick-positive. To these five a further 1 c.cm. was administered. The second retest four weeks later was Dick-negative in one and still definite Dick-positive in four. Another course of 3 c.cm. toxoid was administered to the four remaining susceptible nurses. Three developed immunity within fourteen days of the final injection. One (tested at fourteen-day intervals) did not give a Dick-negative reaction until the sixth week.

Whilst toxoid may solve the reaction-producing problem presented by toxin it has still to be proved an efficient immunising agent.

Cantacuzène (1933) employed formol toxoid in Rumania. The course consisted of three injections. The incidence of scarlet fever in one group of 1158 "completely" immunised children was 1·8 per cent. as compared with 1·6 per cent. in a control group of 2365 non-immunised children; in another group of 1229 "completely" immunised children 0·97 per cent. as compared with 1·8 per cent. in 1291 non-immunised controls. The author condemned the Dick test and active immunisation as a method of control-

ling scarlet fever. We should like to know what is implied by "completely" immunised.

Debré and Ramon (1931) give their experience with anatoxin in various children's institutions in Paris. After vaccination with anatoxin, 65 per cent. of Dick-positive children became Dick-negative, but many lost their immunity within a few months. [Probably indicates inadequate dosage of antigen.] These observers found it difficult to assess the degree of protection conferred by anatoxin. On the other hand the results obtained by Olariu (1931) with scarlatinal toxoid (formalinised toxin) were favourable. Ando and Ozaki (1930) are of the opinion that completely detoxicated scarlatinal toxoid has lost its antigenic power so far as human immunisation is concerned. Futagi (1930) working with a preparation of toxoid produced 84·5 per cent. immunity in a group of susceptible individuals as compared with 99·3 per cent. when ordinary toxin was employed. This markedly antigenic preparation of toxoid still produced undesirable reactions. Moriwaki (1929) did not get good results with various toxoided modifications of streptococcal toxin.

Apparently scarlatinal toxin tends to loose its antigenicity when "toxoided."

GABRITCHEWSKY'S VACCINE

Gabritchewsky's vaccine has of recent years been again extensively employed as an immunising agent against scarlet fever in certain continental countries. This vaccine essentially consists of a mixture of killed streptococci plus streptococcal toxin.

Mstibowsky (1930) records the results of vaccination of some 20,000 children with this preparation. The incidence of scarlet fever in the vaccinated group was 41 cases as against 113 cases in 10,340 controls. Korschun and Spirina (1929) state that 61,820 children have been actively immunised against scarlet fever in Moscow since 1925. Either vaccine, toxin, toxoid, or a combination of these preparations was employed. They consider the method of value in diminishing the morbidity from scarlet fever and more particularly in lessening the case-mortality of the disease. Hoffmann (1934) also speaks favourably of this vaccine preparation and describes Schotmüller's method of combating an epidemic by combined passive and active immunisation.

According to Sparrow (1928) 61 cases of scarlet fever (0·37 per cent.) occurred among 16,345 actively immunised children from 7 to 14 years of age as compared with 1158 cases (1·29 per cent.) among 89,818 non-immunised children of the same age-group.

Zlatogoroff (1930), from the inoculation of 11,709 children in Kharkov, concluded that vaccination had a favourable, if short-lived, effect on the morbidity and mortality of scarlet fever.

CONCLUSIONS

The Dick test is for all practical purposes a reliable index of immunity to scarlet fever.

Active immunisation with graded doses of toxin will rapidly and effectively protect the majority of susceptible persons against scarlet fever. To obtain a lasting immunity at least 80,000 to 100,000 skin-test doses of toxin must be administered in five weekly subcutaneous injections of 500, 2000, 5000, 25,000, and 50,000 skin-test doses. Even with this graded course of injections systemic reactions must be expected in at least 10 per cent. of individuals immunised.

Scarlet fever and diphtheria prophylactics may be safely administered as a combined injection.

The nursing staffs of fever and children's hospitals should be actively immunised against scarlet fever. There is no evidence that clinical scarlet fever has been replaced by "scarlatinal tonsillitis" in successfully immunised nurses, and an immunised nursing staff does not increase the risk of conveyance of scarlet fever to non-scarlatinal patients.

Active immunisation is the most effective method of controlling scarlet fever in residential institutions for children.

Should active immunisation be offered to the public it is essential that an adequate immunising dosage be employed, otherwise the method will get into disrepute.

The possibilities of this method of prophylaxis should be brought to the notice of the general practitioner. Active immunisation of "home contacts" would help to solve the "return case" problem.

So long as the present mild phase of scarlet fever persists a method of control entailing not only five injections, but also the probability of systemic reactions, is not practicable for general application in Great Britain.

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GENERAL MEDICAL COUNCIL

WINTER SESSION, NOV. 27TH–30TH, 1934

APART from disciplinary cases there was little business to claim the Council's attention.

On behalf of the *Pharmacopœia Committee* Sir Henry Dale reported that the monographs on crude drugs, chemicals, and pharmaceutical preparations for the proposed addendum to the B.P. were almost complete. The Pharmacopœia Commission had reviewed the newer remedies and selected those suitable for inclusion, and was now occupied with the preparation of monographs on biological products and preparations of vitamins in agreement with international standards. The principle, he said, was being maintained of excluding from the Pharmacopœia the names of protected substances.

On behalf of the *Public Health Committee* Sir Henry Brackenbury proposed the addition to the resolutions and rules for public health diplomas of a note stating that the requirements both as to curriculum and examinations represented only the

minimum. It was agreed to add a note to the following effect :—

The observance of these rules does not prevent any licensing body granting the degree or diploma, or any institution approved by such body, from requiring a larger number of hours than those specified to be spent in the study of prescribed subjects, or requiring instruction to have been given in subjects additional to those prescribed. Indeed, the use in Rules 8 and 9 of the word "include" implies that knowledge of other subjects may possibly be tested as part of the examination. The duties of local government authorities and their medical officers are constantly being extended by the legislature, and modern scientific research is making available in several new directions knowledge of the greatest importance to medical officers of health and to other medical officers engaged in public health work. These factors emphasise the value to medical officers of a knowledge of such subjects as hospital provision, equipment, and administration; of mental disorder and deficiency; and of genetics—all in their relationship to public health; and these subjects may well become part of the curriculum of public health instruction.

On behalf of the *Curriculum Committee* Dr. H. L. Tidy said that it was not yet in a position to give any full report. They had asked the licensing bodies to tell them of any changes recently introduced into their requirements for the curriculum and to give expression to any wishes for action by the Council. These replies were now being studied.

At a meeting of the *Executive Committee* preceding the Council meeting the following names, erased under Section 14 of the Medical Act, 1858, were restored to the Medical Register :—

Beaumont, William H.
Chrystal, Francis M. (S).
Goldberg, Harry R. (S).
Grant, David R.
Griffiths, Evan H.
Hefferman, John T. (S)
Henderson, Randolph R. (Col).
Johnson, James MacG.
Kearns, Joseph M. (I).
Kelly, John (I).
Lapidus, Hyman E.
Lovegrove, Frederick T. A.
MacConaill, Michael A. (I).
McLean, James Y. (S).
Nenon, Eleyldath K. K.
Miller, Duncan.
Nichol, Robert W.
Norman, Doris B.
Oakley (Mrs.), Mary A.
O'Connor, Roderick (I).
Paterson, William L. (S).
Plunkett, Bernard (I).
Scally, Clara L. M. (I).
Stuart, Christina (S).
Sumner, Theodotus J. (S).
Walsh, Joseph C. (I).
Ward, Hubert Walter (S).

MEDICINE AND THE LAW

Industrial Reactions to Efficiency

IN Davies and others *v.* Richard Johnson and Nephew Ltd. and another four Manchester workmen tried in vain to establish a legal right of action against their employers and a firm of "efficiency experts" whose "observers" stood over the workmen with a stop-watch and timed and noted their every action. The experts were introducing a system of "human power measurement" with a view to advising the employers as to increased output and decreased cost of production. The men, who worked by piecework, objected to this close supervision. The presence of scrutineers at their elbows threw them out of their stride. One of the workmen told Mr. Justice Luxmoore that the effect of the observation was to produce a cold sweat accompanied by loss of appetite for several days. Another said he was haunted in dreams at night by the observer. A third said that the observation produced a "wiggly-woggly" feeling so intense that his hands trembled and he could not do his job properly. It was suggested that materials were wasted and output (and consequently earnings) reduced by reason of the supervision. The four plaintiffs asked for a declaration that it was an implied term of their contracts of employment that the defendants should do nothing to hinder the course of their work. The judge dismissed the claim on two grounds. He thought the men (who had not struck him as displaying any nervous tendency in the witness-box) had grossly exaggerated the physical and mental effect of the experts' observation upon them. And he thought they could not put the implied condition so high as to cover what had occurred. There must also be, he said, an implied condition in a contract of employment that the employer is entitled to see, whether by himself or by an agent, that his workmen are doing their job efficiently, and to observe the workmen's work with a view to suggesting possible improvements, or to substituting other work, or to making savings in the conduct of the work. The judge decided that there had been no breach of contract by the employer and that there was no evidence on which he could hold that the "efficiency experts" had procured any breach. Trade-union representatives had protested to the employers that this system of observation would lower output and earnings and would cause profound irritation among the men. The judge, of course, excluded political considerations.

IRELAND

(FROM OUR OWN CORRESPONDENT)

BICENTENARY AND AMALGAMATION OF A HOSPITAL

IN July, 1734, the first patients were admitted to Mercer's Hospital, and last week the event was celebrated in Dublin. On Dec. 4th, a reception was given by the governors at the hospital, with the Archbishop of Dublin, an ex-officio governor, presiding. Among those present was the Minister for Local Government and Public Health. Addresses on different aspects of the history of the institution were given by Dr. T. P. C. Kirkpatrick, Mr. R. Keatinge, and Sir John Lumsden, and an address on its future by Dr. R. J. Rowlette. Dr. Kirkpatrick pointed out that while Mercer's Hospital was 200 years old, its site had been that of a hospital from the thirteenth century to well on in the seventeenth. Mercer's was the third in order of seniority of the Dublin voluntary hospitals, the two elder being Jervis-street and Dr. Steevens'. He gave many interesting particulars of the difficulties encountered and surmounted by the governors of Mercer's Hospital during the first century of its existence, and of the attempts made to establish it as a teaching centre in connexion with the School of Physic in Trinity College. The first public performance of "The Messiah" of Handel was given in aid of Mercer's Hospital, and much of its income during the eighteenth century was got from charity sermons and musical performances. So important were the sermons in aid of the hospital in the eyes of Dublin society at the time that the Courts adjourned to permit of Bench and Bar attending the services. Mr. Keatinge added details from the early minute books throwing light on domestic conditions. Sir John Lumsden told of the work done in the past 40 years to raise the hospital to a high level of efficiency, and paid a special tribute to his former colleague—Richard Charles Butler Maunsell, surgeon to the hospital for over 30 years. Dr. Rowlette made a statement as to the hopes of the governors and medical staff to bring about an amalgamation of the hospital with

two other institutions of similar scope—Sir Patrick Dun's Hospital and the Royal City of Dublin Hospital. He pointed out that a hospital unit of 100–150 beds could not hope to do its work as efficiently as a larger unit, and stated that the governors had been forced to the opinion that better service for the public and better opportunities for education and research would be obtained by the merging of these three hospitals into one. The proposal had been warmly encouraged by the Hospitals Commission, and a joint committee was busy working out the details of a scheme.

On the evening of Dec. 5th the matron entertained a company of some 300 nurses and guests to a dance in the hospital, and on the next day a dinner of past and present students and members of the staff was held at the Royal Hibernian Hotel when a company of over 200 sat down under the chairmanship of Sir John Lumsden, senior member of the staff.

THE APPOINTMENTS COMMISSION

Since the selection of candidates for appointments under local authorities was committed some eight years ago to a local appointments commission, the working of that body has been closely watched, and its value is now recognised in almost every quarter. Medical candidates are particularly pleased that nowadays they can look with confidence to a fair consideration of their claims and a fair recommendation as a result. The President of the Executive Council, Mr. de Valera, who admitted that he had been at one time prejudiced against the work of the Commission, declared in the Dáil a few months ago that he was quite satisfied that it performed its duties efficiently and fairly. In 1928 a Select Committee of the two Houses of the Legislature was set up to study the working of the Commission. It made a report containing several recommendations of importance, none of which have up to the present been acted upon.

UNITED STATES OF AMERICA

(FROM AN OCCASIONAL CORRESPONDENT)

A PHYSICIAN'S FANTASY

WHEN President Roosevelt, speaking in Washington on Nov. 15th, expressed doubt as to whether the time had come for any federal legislation on old-age security, he added: "Organisations promoting fantastic schemes have aroused hopes which cannot possibly be fulfilled." His words will generally be understood to refer to the proposal of a California physician, Dr. F. E. Townsend. This doctor, retired from service as public health officer in Long Beach, conceived the idea of using old-age pensions as a complete cure for depression and economic ills in general. He would give to every person over 60 years old in the United States $200 a month on the single condition that the money must all be spent within 30 days. This enormous expenditure would prove such a tonic to industry that everyone would find employment and prosperity would return. The huge sums necessary to make these payments are to be raised by a sales tax.

It is not astonishing that Dr. Townsend failed to interest the 1933 Congress in this project. What is remarkable is the success that he met when he appealed for popular support. One meets his ardent disciples in the most remote places, men, and especially women, to whom the Townsend plan has become a veritable religion. Dr. Townsend himself conducts an office in Washington that employs 500 people; to that extent, at least, he has contributed to re-employment. Some 4,000,000 individuals have signed petitions favouring a trial of his plan.

In the same speech that foretold the postponement of old-age pensions Mr. Roosevelt referred to health insurance as due "soon or later." Whether or not a health insurance bill will be introduced in the next Congress, plenty of work on the coming American plan is being done behind the scenes by the President's committee on economic security. The *Journal of the American Medical Association* announces that the presidents of the American Medical Association, the American College of Physicians, and the American College of Surgeons have accepted positions on a medical advisory board. Popular interest in the subject will be maintained by a series of 19 radio addresses under the general title Doctors, Dollars, and Disease, which are sponsored by the National Advisory Council on Radio in Education and will be broadcast over a nation wide hook-up weekly from Nov. 19th to Feb. 25th (10.45 P.M., E.S.T.).

FALLING DEATH-RATES

The Bureau of the Census announces a record low death-rate for the year 1933. There were 1,342,073 deaths from all causes which, on the estimated population for 1933, gives a death-rate of 10·7 per 1000. This is also the first time that mortality statistics are complete for the whole country, the State of Texas having been admitted last year. Deaths from contagious diseases showed a decrease, due chiefly to decreased mortality from influenza and from tuberculosis. Maternal mortality also declined. Cancer deaths remained practically the same as for 1932. Mortality from this cause had increased steadily for 15 years prior to 1933.

The mortality experience of the Metropolitan Life Insurance Company for the first nine months of 1934 indicates that the tuberculosis death-rate has continued its remarkable decline, though the general death-rate may be slightly higher than last year. An unusual feature of this experience is the appearance of divergent trends for pneumonia and influenza, the former having increased while the latter has again decreased. Suicides and homicides have each decreased, but there has been a sharp rise (9·6 per cent.) in the fatalities from automobile accidents.

Panel and Contract Practice

Mortgaging of Practices

AT the November meeting of the Insurance Acts Committee the question was raised as to the prevalence of this practice in various areas. Many instances have occurred in Lancashire and in the London area. Birmingham, it seems, has had only one case of a practice changing hands with a mortgage on it, although of course there, as elsewhere, practices have been bought with borrowed money. It might be argued that a doctor who owes money for his practice on which he has to pay interest would be more likely to give way to lax certification, canvassing, and other doubtful practices with the idea of attracting patients and paying off his loan the more quickly; or equally plausibly that under such financial control he would behave as a salaried assistant and be less liable to ethical transgression. Certain it is that financial organisations are increasingly approaching doctors, especially those with big lists, with offers of attractive

terms if they will sell their practices. Newly qualified men are being circularised with the information that it is quite easy to buy a practice if a particular firm is allowed to advance the money. There is still good reason for initiating the newly qualified medical man or woman in business methods, or for putting him in touch with those competent to advise. But help is now so readily obtainable that the man who decides to take such an important step without advice has only himself to blame if he finds himself in difficulties. On the other hand the firm which offers (say) three years' purchase for a practice and then sells it to a novice may find its capital value a rapidly diminishing quantity. A scheme is in course of construction by representatives of the British Medical Bureau and the Medical Insurance Agency whereby, reasonable cover being afforded, the whole of the purchase money may be provided under terms not onerous enough to embarrass the purchaser or commercialise the practice.

PUBLIC HEALTH

The Nation's Health in 1933

THE Registrar-General's Statistical Review of England and Wales for the year 1933 [1] records a total of very nearly half a million deaths (496,465), of which, taking broad groups, 27 per cent. were debited to diseases of the circulatory system, 14 per cent. to infectious and parasitic diseases, 13 per cent. to cancer and other tumours, 11 per cent. to diseases of the respiratory system, 8 per cent. to diseases of the nervous system and sense organs, 5 per cent. each to diseases of the digestive system and to violence, 7 per cent. to causes peculiar to the extremes of life (premature birth, congenital debility, &c., and senile decay), and 10 per cent. to the remaining causes. Calculation of rates of mortality from this mass of material reveals no very striking changes in the nation's bill of health. The standardised death-rate at all ages was 0·1 per 1000 higher than in the previous year, the mortality of males showing no change, that of females rising by 0·1, while the rate for all persons was 0·5 per 1000 below that of the quinquennium 1926–30. The infant mortality-rate at 64 deaths per 1000 live births was one below the rate of 1932 and four below the rate of 1926–30, and this in spite of a hot, dry summer. The death-rate from diarrhœa and enteritis did reveal a slight rise—at ages under two years it was 6·98 per 1000 live births compared with an average rate of 6·22 for the previous three years—but no movement is to be observed comparable with that of such years as 1911.

Of the diseases of childhood measles showed a peculiarly low level in 1933, less than half the rate of the decade 1921–30, and for a figure equally low one has to go back as far as 1921. The epidemic of cerebro-spinal fever, that reached its mortality peak in 1931, continued to decline slowly, but the rate of 67 per 1,000,000 living at ages under 15 years was still nearly double that of the quinquennium 1926–30. Tuberculosis (all forms) touched another low record with a standardised rate of 799 per 1,000,000, nearly 10 per cent. below the level of the previous five years. Respiratory tuberculosis showed a very slight rise over the figure of 1932, but was also appreciably below the average rate of recent years. When changes in the age constitution of the population are allowed for, the total mortality from cancer is found to have changed inappreciably over the last nine years, the standardised rate fluctuating round 1000 per 1,000,000. The mortality from puerperal causes, expressed per 1000 total live- and still-births, which had shown a slightly improved figure in 1931 and 1932, rose again in 1933 to 4·32, 7 per cent. above the level registered in 1932. A division of the constituents results in an increase of 13 per cent. from 1932 to 1933 in puerperal sepsis and 3 per cent. in other puerperal causes. Deaths from premature birth and injury at birth, it may be noted, are both at a slightly higher level than in the last few years. Stillbirths per 1000 total births show no change in recent years.

Deaths from violence illustrate the customary sex differences. Deaths of males from suicide are more than double the deaths of females—the rate for the former shows a small decline, for the latter a small rise. In 111 murders the females outnumber the males in the proportion of 3 to 1 (only 9 executions took place during the year), and the same ratio is recorded for accidental burns. From scalds, on the other hand, and accidental injuries by falls, crushing, &c., deaths of males are approximately double those of females, while accidental drowning accounts for seven times as many males as females.

The birth-rate in 1933 fell to the lowest point yet recorded (14·4 per 1000 total population), which, taken in conjunction with the death-rate, gives a rate of natural increase of population of 2·1 per 1000.

[1] New Annual Series, No. 13. Tables. Part I., Medical. H.M. Stationery Office. 6s.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED DEC. 1ST, 1934

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 0; scarlet fever, 3701; diphtheria, 1752; enteric fever, 22; acute pneumonia (primary or influenzal), 1073; puerperal fever, 40; puerperal pyrexia, 140; cerebro-spinal fever, 17; acute poliomyelitis, 10; acute polio-encephalitis, 1; encephalitis lethargica, 9; continued fever, 1 (Paddington); dysentery, 29; ophthalmia neonatorum, 75. No case of cholera, plague or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on Dec. 10th–11th, was as follows: Small-pox, 0 under treatment, 2 under observation; scarlet fever, 1828; diphtheria, 2165; measles, 188; whooping-cough, 218; puerperal fever, 19 mothers (plus 9 babies); encephalitis lethargica, 267; poliomyelitis, 9; "other diseases," 286. At St. Margaret's Hospital there were 18 babies (plus 8 mothers) with ophthalmia neonatorum.

Deaths.—In 121 great towns, including London, there was no death from small-pox, 2 (1) from enteric fever, 1(0) from measles, 8 (2) from scarlet fever, 13 (2) from whooping-cough, 57 (10) from diphtheria, 33 (9) from diarrhœa and enteritis under two years, and 64 (10) from influenza. The figures in parentheses are those for London itself.

Bradford reported the only death from enteric fever outside London. There were 5 deaths from diphtheria at Liverpool, 2 each at Harrow, West Ham, Luton, Burnley, Huddersfield, Hull, Manchester, Middlesbrough, and Birmingham. Deaths attributed to influenza occurred in 35 great towns, Sheffield and Sunderland each reporting 4, Liverpool, Newcastle-upon-Tyne, Salford, and Birmingham, each 3.

The number of stillbirths notified during the week was 249 (corresponding to a rate of 40 per 1000 total births), including 41 in London.

CENTENARY OF A GLASGOW HOSPITAL.—The Royal Maternity Hospital, Glasgow, is celebrating its centenary. In the past few years the hospital has dealt annually with about 9000 cases, and about 7000 children are born alive each year in the institution.

CORRESPONDENCE

SEVERE GASTRIC AND DUODENAL HÆMORRHAGE

To the Editor of THE LANCET

SIR,—Statistics of gastro-duodenal hæmorrhage, based on series of considerable size, which have appeared in recent years have all shown a serious mortality-rate. In the annotation in your last issue, accompanying Hellier's careful analysis, you rightly refer to the note of dissatisfaction commou to the various authors. This is a change from the somewhat complacent attitude of ten years ago, before the publication of Bulmer's and subsequent series. But I think that the problem can be narrowed down to comparatively small limits. Three of the progressive steps may be given as follows

Hurst in 1924 gave the mortality from hæmatemesis as 2·6 per cent. Bulmer in 1927 found that the mortality of cases admitted as hæmatemesis between 1902 and 1926 and eventually diagnosed as peptic ulcers was approximately 10 per cent. This was evidence of an unexpectedly high death-rate from hæmatemesis. For the period 1926–31 his figures are 16 per cent. Chiesman in 1932 found a mortality of 27 per cent. in 191 cases of severe hæmatemesis and gross melæna following peptic ulcers, and of 74 per cent. if hæmorrhage was occurring 24 hours later (after admission to hospital).

At first sight it would appear that mortality is increasing or varying greatly in different localities. Actually none of these three series is comparable with the others, the rising figures being due undoubtedly to a stricter selection of the cases included. It may be taken that in these series a group of cases is progressively being separated, amongst which a high proportion of the deaths from hæmorrhage occur.

Aitken carried the process a step further by dividing his cases into two grades of severity. His grading is somewhat, though probably not greatly, affected by all the fatal cases being placed ipso facto in the group of severer hæmatemesis, some of the deaths probably being influenced by other factors. But he clearly separated profuse bleeding into two grades, one grade having a low mortality and the other grade a mortality of one in three, whether treated medically or surgically. The series of Chiesman and Aitken thus agree closely and place a serious aspect on profuse hæmatemesis or melæna.

The recently published figures of T. A. Lloyd Davies and R. W. Nevin (Brit. Med. Jour., Nov. 10th, 1934, p. 858) support and emphasise these conclusions. To cases already classified as exhibiting evidence of profuse bleeding they apply a criterion on which they divide them further into severe or moderate according to their condition on admission to hospital. In the severe group the mortality is 45 per cent., and in the moderate group 6 per cent. The criterion for the severe group (in cases in which the blood was examined) was below 20 per cent. hæmoglobin. Possibly a better figure is 30 per cent. This would further increase the mortality in the severe group and reduce it in the moderate group. On the other hand, they classify the cases according to the condition on admission when exact diagnosis is not always possible, and thus their figures, as Bulmer points out (Brit. Med. Jour., Nov. 17th, p. 920), are not strictly comparable with those for peptic ulcers alone. The general deductions, however, are not affected by these factors. From the studies by Chiesman, Aitken, and Lloyd Davies and Nevin, it is now clear that there is a definite group of severe hæmatemesis and melæna with a very high mortality. They die and they die quickly. A further hæmorrhage within 24 hours is almost a death warrant. The group is not difficult to recognise clinically, although a satisfactory definition is not easy. As Aitken says, "It is nearly always possible to say whether a given case is grave or not." Apart from this group, the mortality of hæmatemesis and melæna (although the bleeding may have been considerable) falls at once to a fraction of the other figure. It is the treatment of this group which needs careful and renewed consideration.

The existence of a group so sharply separated was not clearly recognised in the past. Thus in 1924 a discussion took place at the Royal Society of Medicine on the treatment of severe gastric and duodenal hæmorrhage. At that time the medical treatment of peptic ulcers was just coming to the front but was not generally followed, and surgery was still the predominant mode of treatment, except for acute ulcers. Possibly the conflict between these two methods was a prominent question in the speakers' minds. Hæmatemesis also was considered as a whole with the low mortality which it was held to involve. Many of the pronouncements of the speakers at that meeting are out of date when this serious group with its rapid progress is borne in mind. The following may be quoted :—

> The danger of death from the bleeding is not great. Few patients die from the first hæmorrhage.
>
> If the hæmorrhage is from an acute ulcer, the hope of a complete recovery through medical treatment is very good.
>
> There should be no such thing as the surgical treatment of acute hæmatemesis.
>
> Operation should not be advised while bleeding is persisting, but should be advised not later than 48 hours after it has stopped.

Where these statements refer to facts, they cannot be accepted ; where they refer to opinions, they need to be reconsidered. One may note, for example, that few of us would be prepared to state, on first observation of the patient, that an ulcer was acute and not chronic.

In 1934 the Royal Society of Medicine held a discussion on hæmatemesis. Dr. Abrahams, who opened it, called special attention to the exsanguinated patient. He emphasised the improvement in blood transfusion as compared with 1924. With regard to operation, surgery, he said, must be a direct attack on the bleeding point. Other speakers agreed with these statements, but, apart from this, there was little difference from the discussion in 1924.

We have to consider the question whether the treatment can be improved in this severe group apart from the treatment of hæmorrhage and ulcers as a whole. We know little as to the relation of the fatal cases to a long or short history of previous symptoms, nor as to their relation to acute and chronic ulceration—not always the same question—and possibly to other factors of age and sex.

It will probably be accepted that blood transfusion and even repeated blood transfusion is generally desirable, for we need not now fear the supposed risk of a rise of blood pressure. The question of medical versus surgical treatment cannot be decided on available statistics. There is no doubt that the mortality from operation in these recent series has been very high, but in view of the present general tendency to treat ulcers medically these results may largely represent desperate efforts to save hopeless cases. So far as I know there is no record of a series of

consecutive cases of this type which has been operated upon. No surgeon and indeed no physician is anxious to be solely responsible for them. Yet it would appear that at present, or until we have further knowledge, the decision as to operation should be made at the moment the diagnosis of grave hæmorrhage is decided upon. It is a serious delay for the physician and surgeon to agree to wait and see what happens, as we all do so often. As Aitken says, "There is no means of predicting with any accuracy which grave cases will die," nor which cases will continue to bleed. Perhaps we may learn to do so. Unfortunately, these cases are not invariably due to hæmorrhage from large arteries, the condition most favourable to operation.

As to medical treatment, the mortality under modern methods is fairly clear. The question is whether or not the methods can be improved. We must not accept too readily that blood transfusion, even repeated and with large quantities, is the simple solution, though we may accept it as a routine procedure. Bulmer has expressed doubts as to wisdom of the present use of morphia; and it may be that the stomach can be over-immobilised in these circumstances. Hurst long ago advised washing the stomach with ice-cold water, but personally I have never had the courage to try.

The position is that a group of cases exists which can be easily recognised. Many die and die quickly. We cannot tell at present which will die and which will recover, and the mortality is so high that we cannot regard it with complacency.

I am, Sir, yours faithfully,

Devonshire-place, W., Dec. 7th. H. LETHEBY TIDY.

LONDON UNIVERSITY AND ITS MEDICAL SCHOOLS

To the Editor of THE LANCET

SIR,—The letter of Sir E. Graham-Little in THE LANCET of Nov. 24th raises a point of great interest and importance to medical students and teachers in the University of London. It is, as he points out, a deplorable fact that only a relatively small percentage (56 in 1932, 59 in 1933) of the students of medicine of the University who have passed the second M.B. (anatomy, physiology, biochemistry, and pharmacology) ultimately take the M.B., B.S. degrees because, as he rightly points out, they are often unable on account of economic stress to stay the course.

Now, it is probably true to say that practically every medical student of the University, though intending to proceed ultimately to the degree, first takes the qualification of the Conjoint Board (M.R.C.S., L.R.C.P.) which he can do at a somewhat earlier period than he can sit for the degree. This enables him to register and to go out and earn some money as an assistant or perhaps in a practice of his own. In almost every instance he intends to keep up his reading and come back in a year or so and take the third or final M.B., B.S. But here comes the difficulty. The final examination comprises pathology, bacteriology, forensic medicine and public health, medicine, surgery, and midwifery. Though this can be passed in two groups one of the groups is composed of surgery and midwifery (B.S.), the other of medicine, pathology, bacteriology, and forensic medicine including public health and hygiene (M.B.), and failure in one subject of a group means failure in a group. There would be comparatively little difficulty in keeping up the three clinical subjects, and even improving his knowledge of them, for he is in touch with them in the course of his daily work. It is, however, utterly different in regard to pathology and forensic medicine. These are academic subjects with little relation to his daily experience in general practice and if he is to keep up to examination standard he must do it by a pure "grind." Even that may be impossible, for there is no access to actual pathological material and specimens. Is it any wonder that many give up the struggle and never return to face the final M.B., B.S.?

The remedy is, to my mind, simple. Let a third professional examination be instituted comprising pathology, bacteriology, forensic medicine and public health, and make it possible for this to be taken, say at the end of the fourth year and before it is possible to sit for the final examination of the Conjoint Board. He would then, no doubt, take the Conjoint examination as usual, but having already passed in pathology and forensic medicine would have little difficulty, even though he had gone into general practice, in getting up his three clinical subjects to the degree standard. At least the attempt would not be the hopeless struggle that it so often is at the present time.

I am, Sir, yours faithfully,

F. J. BROWNE.

Obstetrical Unit, University College Hospital Medical School, Huntley-street, W.C., Dec. 6th.

To the Editor of THE LANCET

SIR,—In your issue of Nov. 24th Sir Ernest Graham-Little commented on the very small proportion of students studying for a London University degree who actually proceed to that degree. I should like, if I may, to express a student's view-point. There are of course several factors in the situation—e.g., finance, the quality of the student, the training at the medical school, the examination itself. In your leading article of Dec. 1st (p. 1230) you show that the financial advantage lies with the student who takes the M.B., B.S. for 12 guineas rather than the Conjoint qualification for 40 guineas—the usual alternative. As for the London student, the fact that the majority of degree candidates achieve success up to and including the second M.B. shows that there is nothing wrong with his intellectual standard. Again, the medical schools prove their fitness by their success in getting the very large majority of their students through a qualifying examination.

There remains the examination itself, and by this I mean the final examination. Let us first carefully analyse this examination and see what can be learned from it. It is intended to be a "qualifying" examination—i.e., one to which a candidate should proceed on completing a three years' studentship subsequent to second M.B., and one which he should have a reasonable chance of passing after this training. That it is not so regarded is common knowledge amongst London medical students; with very few exceptions they would not dream of taking it at the end of their student career. What they do is to take some other qualification and then proceed to hold house appointments at their own and other hospitals. Eventually after having acquired greater experience they take London degree finals—and even then a considerable number fail to pass. Coming up in May on completing my student appointments at a provincial medical school to take the examination as an external candidate, I found that I was competing with men who had held important house posts for as much as

two years after qualifying elsewhere. All the candidates of whom I inquired said they were already qualified.

Even the examiners must believe most candidates to be qualified, for I was asked by one in a viva-voce if I was in general practice. The entry form has in fact a space on it for "any registrable qualification with date." It would therefore seem that the London final examination is different from that of other universities in that it is *not* the examination by which the candidate seeks to get his first qualification. In the provincial universities most students do qualify via their own M.B., and it is mainly those who fail who seek a qualification elsewhere to avoid waiting six months before entering for their own degree again. The pass percentage is certainly much higher at other universities than London; the candidates are definitely recognised as students and are examined as such. Candidates come up for these examinations at the end of their student clinical studies. To do this full course as I did and then to be "ploughed" in the four important subjects is an "achievement," as one member of my family put it. This result could have been gained without any course of study, let alone after conscientiously doing a three-year course.

How then can this be remedied? I submit three suggestions:—

1. Conduct the examination as a real "qualifying" examination, recognising that it marks the end of a student course and one to which the candidate can proceed confidently after this course is completed. The final M.B. is not, and never ought to be, a post-graduate qualification and I am sure the General Medical Council do not look upon it as such.

2. To divide the examination into two parts, allowing pathology, forensic medicine, and hygiene to be taken at the end of the fifth year. As the examination now stands, it is an ordeal lasting nearly a month—too big a strain on any candidate.

3. Render the course more attractive by adopting Sir Ernest's excellent suggestion of granting a degree after three years, as is the case in any faculty other than medicine.

Finally I would suggest that external students should be made known as such to examiners, thereby recognising that they may have, and express, views differing from those held in London. As there is a remote possibility that I may again appear before them I prefer to withhold my name and sign myself,

Sir, Yours faithfully,

Dec. 3rd. A REGISTERED STUDENT.

SERUM PROPHYLAXIS AND PUERPERAL SEPSIS

To the Editor of THE LANCET

SIR,—May I, an amateur in matters of immunology, express my congratulation to Dr. Pulvertaft on his proposal to regard the pregnant woman as a potential septicæmic and to treat her accordingly? In an article which you have accepted for publication I have set out a series of cases of joint tuberculosis treated at this sanatorium, showing the fall in the incidence of secondary infection of tuberculous joints following the introduction of Dick-toxin immunisation of patients on admission. This series of cases is suggestive but not conclusive of the value of Dick-toxin immunisation in this respect. An alteration in the method of treating some forms of tuberculous abscess may have contributed to the fall in the rate of secondary infection. I would unhesitatingly say however that Dick-toxin immunisation is worthy of further investigation as a means of preventing acute streptococcal infections in tuberculous joints. I can therefore sympathise with Dr. Pulvertaft in his advocacy of similar means with a view to reducing the incidence of puerperal septicæmia.

I am, Sir, yours faithfully,

M. C. WILKINSON,
Medical Superintendent, Essex County Council Sanatorium, Braintree.

Dec. 8th.

To the Editor of THE LANCET

SIR,—Dr. Pulvertaft deplores the fact that parturient women are not protected against the risk of puerperal sepsis by an injection of antitoxic (streptococcal) serum. Does he suppose that no one has considered the merits and demerits of such a procedure hitherto? He appears to base his own assurance as to its efficacy on the experiments of Parish and Okell[1] which showed that rabbits could be protected, for six days at any rate, by an injection of antitoxic serum given several hours before an enormous inoculation of an avirulent streptococcal culture into the blood stream. It may be noted that these experimental conditions differ profoundly from those which obtain in the woman whose lacerated tissues are freshly infected by a virulent streptococcus; and, further, it is a matter for regret that the effectiveness of the rabbit-protection was judged on survival of the animals *for six days only*. Before they were killed on the sixth day these "protected" rabbits "almost always" developed a suppurative arthritis (and sometimes pericarditis) from which hæmolytic streptococci could be cultivated, so that the serum can hardly be credited with having prevented infection of the tissues. These experiments then give us, at best, a rather doubtful basis for prophylaxis in man, and even those who reported them have been careful not to assert that the serum in man will "certainly do good," as Dr. Pulvertaft claims. I would submit that this doubtful basis has been so much weakened as to be almost negligible by all that has been learned since 1928, of which Dr. Pulvertaft tells us nothing. We have learned:—

(*a*) That immunisation of human beings (staffs of fever hospitals) with Dick toxin, although it apparently prevents the subsequent development of scarlatiniform rashes, gives no protection against infection by the hæmolytic streptococcus (tonsillitis, &c.)—a fact which would seem to sweep away the hypothetical foundation on which prophylaxis by antitoxic serum is built.

(*b*) That the injection of antitoxic and "antistreptococcal" sera sometimes *favours* the development of the incipient streptococcal infection which it is intended to prevent. Penfold and Butler[2] infected large numbers of mice intraperitoneally with hæmolytic streptococci freshly isolated from acute human infections (including puerperal fever) and at the same time inoculated some of the animals with antitoxic and "antistreptococcal" sera (various brands of British, American, and Australian manufacture). Very few of the experiments showed any trace of protection at all by the sera, but many of them showed unmistakable evidence that the administration of serum *hastened the death of the animals*.

(*c*) That an injection of horse serum (normal or "immune") into an animal previously sensitised to that serum (as many human beings are) interferes

[1] Parish, H. J., and Okell, C. C.: Jour. Path. and Bact., 1927, xxx., 521, and THE LANCET, 1928, i., 746.
[2] Penfold, W. J., and Butler, H. M.: Med. Jour. Australia, 1932, p. 717.

very seriously with the ability of that animal to deal with an infection by hæmolytic streptococci (Burn, Chandler, and Hartshorn [3]).

(*d*) That there is very grave reason to suspect that antitoxic and "antistreptococcal" sera in man may not "prevent further damage," as Dr. Pulvertaft so confidently asserts, but may actually promote such damage. Our experience at Queen Charlotte's Hospital with over 40 serum-treated cases, all of whom were infected by hæmolytic streptococci, points very strongly in that direction. True, this evidence (which I hope to publish in full within the next few weeks) deals with therapeutic results rather than prophylaxis, but have we any reason for believing that an agent which apparently is capable of harmful effects during the early stages of an established infection will have a directly opposite effect at the very beginning of such an infection? I think not—and the mouse experiments of Penfold and Butler would seem to support my contention.

The above—and other evidence which cannot well be dealt with in a short letter—leads me, Sir, to the conclusion that there is at present no substantial ground whatever for believing that antitoxic serum will protect any woman against infection by a virulent streptococcus. On the other hand, it is certain that a panic policy of wholesale prophylaxis would cause many women to suffer the miseries of serum sickness quite unnecessarily, would involve a great expenditure of public money, and might well increase rather than decrease the risk of puerperal sepsis. Most of our work in these laboratories is directed to the finding of an effective prophylactic or "checking" agent, but I will frankly admit that it is not yet in sight.

I am, Sir, yours faithfully,

LEONARD COLEBROOK.

Queen Charlotte's Maternity Hospital, Bernhard Baron Memorial Research Laboratories, Hammersmith, W., Dec. 10th.

UNQUALIFIED RADIOLOGY

To the Editor of THE LANCET

SIR,—As a hospital administrative officer of 40 years' standing and a student of radiology since the days when Rontgen's discovery left its cradle in the laboratory and was accepted as an ancillary branch of medical practice, my attention was attracted to the letter under this heading in your issue of Dec. 1st over the signatures of Mr. G. Shearer and Dr. J. Duncan White of the British Institute of Radiology. The early workers in the field of radiological research, perhaps with greater forcefulness than any others, can offer Mr. Shearer and Dr. White whole-hearted support in their aim to limit the practice of medical radiology to those who are equipped with adequate knowledge and experience. They witnessed the disasters of uninformed practice which have no parallel to-day notwithstanding the continued existence of isolated irregularities. A brief review of the history of radiology will throw some light upon the cause of the irregularities and may indicate the way in which ultimately they will be eradicated.

The news of Rontgen's discovery spread rapidly, as also did the significance of its value in the diagnosis of physical abnormalities and later in the treatment of disease, but a knowledge of the physical and therapeutic properties of the new radiation was much more slowly disseminated from the centres of learning; thus it happened that enthusiasm too often exceeded ability and an aftermath of suffering followed. The new-born child was the victim of disease soon after its birth. That radiology survived as an ancillary branch of medicine is due to the courage and devotion of distinguished physicists, physicians, engineers, and men whose only qualification was a knowledge of physics. Their example attracted to their ranks a gradually increasing number of workers, often men who sought no reward other than the pleasure of service. Step by step, the personnel of the X ray departments, if such they could be called, established in the cellars of many hospitals, was improved, and the work which in many instances had been relegated to mechanics, and often to porters under medical supervision of a nominal character, came under the care of skilled operators working in coördination with the clinicians. Under these conditions increasingly good work was done, resulting in increasing demands for services. This coördinated service had a mutual educational value, and the reason why the older members of the medical profession continue to recognise the lay workers' service is obvious.

The rapid evolution of radiology, especially of diagnostic radiology, has in recent years attracted to its service an increasing number of medical men willing to devote their time exclusively to the study and practice of the science. That there is ample scope for this no one can deny, for there is an immense field for study and research. The educational process, so slow in its beginnings, has become progressively more rapid. The services of the specialist in radiology are appreciated to so great an extent that the demand for services cannot invariably be supplied. Medical practitioners isolated in districts remote from hospital centres cannot always secure readily the expert aid they need. The medico-legal aspect of practice in its association with radiology is a source of constant anxiety, and if the medical practitioner, faced only with this difficulty, can secure the apparatus necessary or the service of someone possessing the apparatus to make such minor examinations as fractured bones require, a very good purpose is served. The practice cannot be advocated as a counsel of perfection and it is not likely to survive when facilities for expert examinations are adequate.

A perspective view of all the events shows that the sickly child is becoming strong and healthy. There are few diseases which do not carry with them their own antitoxins. Educational propaganda must eventually be more effective than legislation. That there will be further developments seems highly probable, for regional work which combines medicine, surgery, and endoscopy with radiology is slowly gaining popularity.

I am, Sir, yours faithfully,

HAROLD WIGG,

Secretary to the Hampstead General Hospital, and Officer in Charge of X Ray Department, Royal Buckinghamshire Hospital, Aylesbury.

Belsize-lane, Hampstead, N.W., Dec. 5th.

A PUBLIC ASSISTANCE PANEL

To the Editor of THE LANCET

SIR,—On page 1304 of your last issue there is a note on the decision of the public assistance committee of Warrington to inaugurate a panel in the place of the district medical service, if the approval of the Ministry of Health can be obtained. We in this county have had to contend with a similar situation. The Hampshire public assistance committee also desired to organise a panel system to take the place of salaried district medical officers. There

[3] Burn, C., Chandler, C., and Hartshorn, M.: Jour. Exp. Med., 1934, lx., 1.

was strenuous opposition to these proposals. The district medical officers organised themselves to defend their position, they received the support of the medical advisory committee and of general medical opinion in the county, and as a result the project has been shelved for two years. We cannot, however, look upon this as more than a temporary respite unless we can meanwhile get into touch with such medical opinion elsewhere in the country as is also opposed to the new proposals. The undersigned, who is chairman of the committee of Hampshire district medical officers, would welcome communications from practitioners in other counties holding similar views.

I am, Sir, yours faithfully,

J. A. BALCK FOOTE.

White Lodge, Andover, Dec. 8th.

INSULIN HYPOGLYCÆMIA

To the Editor of THE LANCET

SIR,—Dr. Cooke's interesting article in your last issue (p. 1274) includes a valuable table showing the relative frequency of the well-known symptoms of insulin hypoglycæmia in addition to recording two new ones. He states that "In spite of the variety of manifestations . . . . the initial symptom in any one subject is nearly always the same in successive attacks." But there are many exceptions to this; for instance, one patient of mine who has taken insulin for nine years has had the following symptom-complexes on different occasions:—

(1) Weakness and malaise associated with lack of precision in thought ..	Many times.
(2) Sweating, tremor, palpitation of the heart	6 or 7 times.
(3) Difficulty in writing or speaking, followed by drowsiness	About 3 times.
(4) Double vision	3 times.
(5) Sudden unconsciousness	Once.

I believe that these different manifestations correspond to different levels of the blood-sugar or to different degrees of fall, but proof has not yet been obtained.

Dr. Cooke suggests that if a patient were taught his own symptoms by a deliberate overdose and then carried glucose tablets about with him "the inconveniences and possible dangers of hypoglycæmia would be practically non-existent." But again there is a difficulty; even if the patient recognises the symptoms he is often in a state of perversity, negativism, or recklessness, comparable to conditions produced by alcohol; his judgment and his sense of danger are in abeyance and although he carries sugar with him he will not take it, and refuses it when it is offered. I have seen this on several occasions in persons who are otherwise careful and steady.

I am, Sir, yours faithfully,

G. M. WAUCHOPE.

Brunswick-place, Hove, Dec. 10th.

To the Editor of THE LANCET

SIR,—Dr. Cooke has given a good description of the best method of treatment for a severe attack of hypoglycæmia, in which the patient is unable to swallow a sugar solution. It does not take long in a hospital to prepare a sterile solution of glucose for intravenous injection, but this is very difficult in the home and some patients unfortunately have severe attacks of hypoglycæmia after leaving hospital in spite of careful instruction in the signs of overdose. Dr. Cooke says that "the subcutaneous injection of adrenaline . . . has little to recommend it, as its effectiveness depends on the presence of an adequate store of glycogen in the liver—a condition liable to be lacking in the diabetic." Although it is probable that the store of glycogen in the liver is low, there may be enough to raise the blood-sugar sufficiently to enable the patient to swallow sugar by mouth. I have seen patients in hospital recover consciousness after an injection of 1 c.cm. of adrenaline, but I now recommend the giving of 1 c.cm. of pituitrin which has the effect of raising the blood-sugar and does not seem to be so dependent on the presence of glycogen in the liver. The pituitrin should be given by the nurse or patient's relatives as soon as possible. The patient should be given a drink containing 1 oz. of sugar (6 lumps of cane sugar) as soon as he can swallow, in order to prevent a return of the hypoglycæmia.

Dr. Cooke says that the "rectal administration of glucose is uncertain on account of difficulties of retention and slowness of absorption. . . ." This is doubtless true, but it is worth while trying its effect, and it can be given by the patient's nurse or relatives while the pituitrin is taking effect—pending the arrival of the doctor, which may take a considerable time. If the patient is still unconscious in spite of this treatment the doctor should give 2 oz. of glucose in 10 oz. of water by a stomach-tube, and repeat the injection of 1 c.cm. of pituitrin. The preparation of sterile glucose solution and the arrangements for the intravenous injection can then be proceeded with, but it is unlikely that this will be necessary as the patient will probably have recovered long before they can be prepared in a private house. The morning and evening dose of insulin should each be reduced by 10 units after a severe attack of hypoglycæmia.

It is fortunate that severe attacks of hypoglycæmia only occur very occasionally as they are very alarming for the relatives. Provided the attacks are treated with pituitrin and sugar either by rectum or by mouth, or by an intravenous injection, it is certain that the patient will recover, unless he has been unconscious for a long time before treatment is started.

I am, Sir, yours faithfully,

Harley-street, W., Dec. 10th. GEORGE GRAHAM.

ULCERATION FOLLOWING GASTRO-JEJUNOSTOMY

To the Editor of THE LANCET

SIR,—I owe Prof. Pannett an apology. I read his book, "Gastro-duodenal Ulceration," shortly after its publication in 1926, but I am afraid I was so much interested in its more controversial contents that I overlooked his references to recurrent duodenal ulceration following gastrojejunostomy. Lord Moynihan has kindly sent me details of similar cases which have come under his care. He tells me that the first case in his own practice led him to the conclusion that the ulcer must be dealt with directly—i.e., by cautery excision and temporary closure of the pylorus by purse-string or infolding suture on the proximal side. In this way he has eliminated persistence or recurrence of duodenal ulceration.

Prof. Pannett takes me to task in that I do not represent the facts quite fairly when I say that German surgeons have adopted gastrectomy in preference to gastrojejunostomy. He would like me to substitute for gastrectomy the term duodeno-gastrectomy. I have no objection to this, but I really believed, and still do, that the beneficial and

essential part of this operation as applied to duodenal ulcer is concerned with the stomach and not with the duodenum. The German surgeons, as I pointed out in my letter, have been influenced in their procedures by the frequency with which duodenal ulceration was complicated by gastric ulceration. No such frequency is seen here or in America and I do not see why patients in this country should be subjected to gastrectomy (or duodeno-gastrectomy) for duodenal ulcer because their fellow-sufferers abroad have got more refractory stomachs. I am not forgetting that fear of gastrojejunal ulceration has also influenced German surgeons in their decision against gastrojejunostomy. In the type of stomach with which they have to deal, gastrojejunal ulceration is naturally more prone to occur; and to avoid this complication it is doubtful if partial resection of the duodenum and pyloric part of the stomach is sufficient. In this connexion, Prof. Pannett quotes the name of Finsterer. I had the pleasure, some years ago, of watching Prof. Finsterer at work (in Vienna) and also of assisting him with a few of his cases. It struck me at the time that the partial gastrectomy for duodenal ulcer which he performed was no half-hearted measure, but a fairly generous ablation of stomach tissue—more than half the organ being removed. And why? Because gastrojejunal ulcer is not unknown after pylorectomy; in fact gastrojejunal ulcer has occurred after much larger parts of the stomach have been resected. But I am sure that many surgeons agree with C. H. Mayo when he said "If any man wanted to cut out half of my good stomach in order to cure a little ulcer of my duodenum, I would run faster than he."

The duodenal part of the operation of duodeno-gastrectomy is somewhat of a puzzle, to me at any rate. Ulcer of the posterior surface of the duodenum is not uncommon and its proximity to bile-ducts or the hepatic artery may make the operation dangerous or impossible. In such cases Finsterer performs partial gastrectomy proximal to the pylorus, and according to Hurst his results have been no less satisfactory than those in which duodenectomy had been carried out. Why then carry out the duodenectomy? Perforation or hæmorrhage? These can be eliminated without the bigger operation. One must not withhold from Prof. Pannett admiration and congratulation on the excellent results he has obtained with duodeno-gastrectomy; his mortality is lower than that of continental surgeons, with the possible exception of Prof. Finsterer. At the same time Walton has estimated that the mortality-rate of partial gastrectomy for duodenal ulcer is 6 per cent. whereas that of gastrojejunostomy is 2 per cent. This means that the mortality for this operation alone is greater than that for gastrojejunostomy plus gastrectomy for recurrent ulceration (when required). And this is the mortality in skilful and experienced hands: what are going to be the results if surgeons who have not Prof. Pannett's skill, or continued opportunities for performing this operation, decide to adopt it? It seems a pity that he should urge us to abandon the comparatively safe operation of gastrojejunostomy—particularly when such brilliant results have been obtained by Lord Moynihan and Walton and other leading surgeons in England. The type of operation performed by these surgeons eliminates the danger of recurrence of ulceration in the duodenum, and the incidence of gastrojejunal ulcer in their series is admittedly small.

I am, Sir, yours faithfully,

Wimpole-street, W., Dec. 11th. MICHAEL J. SMYTH.

KNOWLEDGE OF GOOD AND EVIL

To the Editor of THE LANCET

SIR,—In your review of the "Encyclopædia of Sexual Knowledge" (THE LANCET, Nov. 10th, p. 1053), you appear to deplore "extensive quotations . . . from books the sale of which has hitherto been confined to members of the legal and medical professions." I am not clear as to whether the book is made unsuitable by technical passages which the public will not be able to understand, or whether you fear that they may learn more than is good for them. I am interested because, while I have often seen cases in which ignorance of sexual matters has contributed to a patient's misfortune, I cannot recollect ever to have been consulted by one who was suffering from too much knowledge.

I am, Sir, yours faithfully,

Santa Fe, New Mexico, Nov. 27th. J. ROSSLYN EARP.

ELECTRICAL SLAUGHTER AND ANÆSTHESIA

To the Editor of THE LANCET

SIR,—In a lecture briefly reported on p. 1321 of your last issue Sir Leonard Hill recommends electrical methods of slaughtering animals and speaks of the anæsthetic effect of the electric current. I would like to suggest that the tests of consciousness used in chloroform anæsthesia cannot safely be assumed to be valid in the case of an animal or person who has been immobilised as a result of an electric stimulation of the brain. The matter is of great importance because, as a result of the Slaughter of Animals Act, electric immobilisation is being extensively employed in the slaughter-house as an alleged anæsthetic; and its use for operations, both veterinary and experimental, has been proposed. The question, nevertheless, is still unsettled, and until there has been further investigation statements should not be made which imply that electrolethalling has been proved to cause genuine anæsthesia. Objective data on the subject are extremely restricted in their scope, but the following facts appear to be definitely established—

(1) It is possible to produce, by passing a suitable electric current through the brain, a "nightmare" state in which the subject retains his senses but appears to an external observer to be completely unconscious, the pupil reflex being absent. The conditions under which this state can be produced have not been satisfactorily delimited, but they seem to approach those employed in the slaughter-house. The requisite range of conditions, whatever it may be, is one which sometimes although very rarely occurs in electrical accidents.

(2) A weak interrupted direct current produces the same objective phenomena as sinusoidal (electrolethaller) current 20 times stronger as read with an ammeter. Thus it is found that to get the desired objective effects on pigs in the slaughter-house the sinusoidal electrolethaller current must lie roughly between ½ ampere and 1 ampere, while Regensburger gets similar results with 10 per cent. interrupted direct current of from 31 to 53 milliamperes.

(3) Controlled experiments on human beings have not been carried quite up to the point where the subject fails to recover his mobility immediately on the cessation of the current. In slaughter-house practice the current strength lies just above this point, and it must have done so in the case of those rare electrical accidents in which the nightmare state persists after the accident.

(4) Leduc submitted himself to interrupted direct current up to 4 milliamperes, but failed to reach unconsciousness, although his assistants supposed him to be completely unconscious for 20 minutes. He felt sure, however, that if the current had been raised a very little higher unconsciousness would have ensued. Dr. J. Hertz, at the Rothschild Hospital in Paris, therefore repeated the experiment with currents up to 25 milliamperes (or 18 milliamperes where the "on" period was 10 per cent.) but

Leduc's prediction was not fulfilled. The subjects failed to pass beyond the nightmare state. They exhibited permanent dilation of pupils and were unable to respond to stimuli, but they retained their sensibility.

(5) Breathing was sometimes inhibited during the nightmare state in Hertz's subjects, and in some victims of electrical accidents. Zimmern in particular refers to an accident in which the victim knew that he could not breathe voluntarily and dreaded that artificial respiration might be abandoned prematurely.

(6) The muscles in Hertz's subjects were sometimes contracted and sometimes relaxed. The absence of squealing in electrolethalled pigs is not therefore necessarily due either to muscular contraction or to unconsciousness. It may, for all we know, be due simply to the nightmare state.

I intend to publish before long a more detailed statement of the above points; the purpose of the present letter is to urge that there should be no attempt to discourage inquiry into an unsettled question.

I am, Sir, yours faithfully,

C. W. HUME.

Finchley, N., Dec. 8th.

THE KETOGENIC DIET IN INFECTIONS OF THE URINARY TRACT

To the Editor of THE LANCET

SIR,—I have been greatly interested in Dr. C. M. Wilson's article in your last issue, on Prognosis in Infection of the Urinary Tract by the Colon Bacillus, because I have been following his technique for two years with considerable success.

May I therefore comment on two points? The first is that though in his 100 cases the diet was successful in 88, it is to be noted that of the 12 failures 8 were men. Now, he treated 32 men, so that 25 per cent. were failures. Similarly, of the relapses amongst his successful cases during the last year 35 per cent. occurred in men. These significant figures suggest that women are much more likely to be curable than men, a suggestion strengthened by the known fact that the pyelitis of pregnancy tends to spontaneous cure. The explanation I offer for this difference in the sexes is that the urinary tract of women is much less complicated. The trouble with men is residual foci in the prostate, vesicles, and epididymes; and unless these are treated relapse is almost bound to occur.

We are greatly indebted to the physicians for putting into our hands a weapon such as the ketogenic diet. It has rescued many of us from a pessimism almost of despair in the treatment of chronic colon-bacillus infection. But its limitations ought to be understood; and I think it will greatly diminish the failures and relapses, and the consequent despair of male patients, if adequate surgical attention is paid to the comparatively accessible foci which are often present in the genital tract in the male.

I am, Sir, yours faithfully,

J. JOHNSTON ABRAHAM.

Queen Anne-street, W., Dec. 11th.

ALLEGED IMPROPER PROFIT

To the Editor of THE LANCET

SIR,—I was amazed to read in your last issue, under this heading, the case before the General Medical Council of an unfortunate doctor who had charged his patient a little more for spectacles than the cost. What worries me is the fear that I may be sent for by the G.M.C. for committing the same crime in selling for 2*s.* 6*d.* upwards a bottle of medicine which in many cases only costs a penny or twopence. If the G.M.C. has nothing better to do than investigate a case of this sort it is about time it were re-formed.

I am, Sir, yours faithfully,

Gillingham, Dorset, Dec. 10th. P. G. FOULKES.

PROFIT ON MEDICINES

To the Editor of THE LANCET

SIR,—The county council of Sutherland have recently requested the parish medical officers under them, who in the outlying districts supply and charge for medicines, &c., to paupers, in future to give prescriptions of these medicines to be collected by the clerk to poor assistance authorities and forwarded to the Glasgow bureau in order to have prices checked on National Insurance tariff. I desire to know if it is legally competent for the county council to do so, seeing the various medical officers render accounts for the medicines supplied to paupers at ordinary retail prices, plus containers and postages.

I am, Sir, yours faithfully,

Dec. 10th. NEW ECONOMY.

OBITUARY

ELEANOR DAVIES-COLLEY, M.D. Lond., F.R.C.S. Eng.

WE regret to announce the death of Dr. Eleanor Davies-Colley, senior surgeon to the South London Hospital for Women, whose death occurred in Harley-street, London, on Dec. 10th.

Eleanor Davies-Colley was born in 1874 the daughter of Mr. J. N. C. Davies-Colley, the distinguished surgeon who was for many years on the staff of Guy's Hospital, while her mother was the daughter of the late Mr. Thomas Turner, treasurer of that institution. She received her medical education at the London School of Medicine for Women, obtaining the necessary clinical practice at the Royal Free Hospital. She was throughout a brilliant student. She graduated M.B., B.S. Lond. in 1907, proceeded to the M.D. degree in 1910, and in 1911 was the first woman to secure the diploma of F.R.C.S. Eng., sitting for the examination without having previously taken the membership. After serving as house surgeon at the New Hospital for Women in Euston-road, she became demonstrator in anatomy at the London School of Medicine for Women and subsequently surgical registrar at the Royal Free Hospital. She was elected to the surgical staffs of the South London Hospital for Women and the Elizabeth Garrett Anderson Hospital, and at the time of her death was the senior surgical member of the staff at each institution. She had been suffering from thyroid toxæmia and died in her sleep.

Miss Chadburn writes: "My first recollection of Miss Davies-Colley dates back to her student days. As a student she came to my out-patient clinic at the Elizabeth Garrett Anderson Hospital. I well remember often wondering what she was thinking about as she sat beside me quietly observant, somewhat critical. Evidently a fine person, with medical tradition behind her and full of promise for the future, rather older, more experienced, and more generally cultured than most of the students. I instinctively felt an admiration for her, and I remember hoping that she did not think my teaching poor stuff. Next I remember her as my house surgeon, one of the best, if not the best I ever had, sympathetic, kindly understanding with the patients,

interesting to work with, absolutely honest and reliable, a good diagnostician, an able assistant, and last, but perhaps not least, very good to look at, an inspiring, gracious, gentle, and strong personality with a smile that lit up her face in a wonderful way, and a sense of humour that positively made one happy to be with her. So she struck me then—25 years ago. I little thought at that time that I was to have 24 years of intimate friendship with her, and such joy and belief in another human being as rarely falls to the lot of man or woman in this world.

"About a year later she came to live with me at 16, Harley-street, and together we worked out the founding of the South London Hospital for Women; she shared with me all the excitement and satisfaction that success in that venture produced. She was one of the original surgeons to this hospital, at her death the only original member of the honorary staff left, her period of service has lasted (until her death last Monday, Dec. 10th) in all over 22 years. She helped greatly in establishing the surgery and the surgical reputation of the South London Hospital. She worked also for some years as senior obstetrician at the Elizabeth Garrett Anderson Hospital, and also for some years as surgeon to the Marie Curie Hospital; she was a member of the Cancer Research Committee of that hospital, and working on the staff of this latter hospital at the time of her death.

"Miss Davies-Colley was intensely sensitive and highly strung; she felt the war deeply, but though sympathetic with all loyal effort made then, and essentially a brave person anxious to fulfil any demand upon her, her opinion was that medical women were most wanted for medical work at home. She at no time contemplated Army service, but she did much free work for the wives and officers and men at the front. Perhaps only those of us who were privileged to know her well could realise her rare spirit, her fine personality, her integrity of purpose. She was impatient of all bombast, self-importance, and self-seeking to such a degree that she found it difficult to push her way to the position she attained. Her transparent honesty occasionally caused a faux pas which gave her pain. She disliked social functions of all sorts, but to meet others in real friendship was a great pleasure to her. House surgeons, colleagues, nurses, her family and her friends found inspiration in contact with her gracious and gentle personality, and felt it an honour to work with her. Those who knew her intimately turned naturally to her for opinions and advice. Patients both in private and in hospital practice trusted and even adored her. As a surgeon she fulfilled the promise of her training, while in addition to skill and intelligence no trouble was too great to ensure the result desired—it was good to see her at work, and she used to say herself that the needlework part of surgery was no difficulty to her, certainly her cleverness with the household needle stood her in good stead with the surgical needle.

"Her sudden unexpected death has caused profound gloom to fall over both her hospitals. I fear my contribution is only an unworthy appreciation of a rare spirit, a delightful human being, a level-headed, honest worker; with admiration and with love her memory will be cherished by all who knew her"

ALEXANDER ARTHUR MACKEITH, M.B. Glasg.

Dr. Alexander MacKeith, whose death on Wednesday, Dec. 5th, followed a long illness, was a well-known member of the medical profession in Southampton and the neighbourhood. Born in Glasgow in 1866, he came of a family of doctors. He received his medical education at the University of Glasgow and his clinical training at the Western Infirmary, and graduated as M.B., C.M. in 1887. He then practised for some years in the West of England, in Exeter and in Ilfracombe, before settling five-and-thirty years ago in Southampton. While at Ilfracombe he wrote some notes upon the place as a health resort and began his long association with ambulance work and the volunteer medical service, but his public services date from his residence in Southampton. In 1905 he put his views upon provident medical service before the profession in a paper contributed to the *British Medical Journal*, and these took concrete shape in the Southampton public medical service and the hospital contributory scheme in Southampton, for both of which organisations he was largely responsible, while of the latter he remained vice-chairman until his death. He was also chairman of the committee of management of the Free Eye Hospital, Southampton, for a long period, and remained on the committee after having passed the chair. He was an active member of the B.M.A., being at different times representative of the Southampton division and president of the southern branch.

Dr. MacKeith was a surgeon-major in the 1st Hants R.G.A.(T.), and during the war was medical officer to the prisoner of war camps. He was responsible for a local medical war emergency committee which arranged for carrying on the practices of doctors who were away on active service, and the excellence of his management of this delicate work was recognised at the termination of the war by the presentation to him of an illuminated address and a silver salver, subscribed for by his fellow practitioners.

The following tribute reaches us from the hon. secretary of the Southampton division of the British Medical Association: "A man of logical mind with a keen insight and the power to take the long view, MacKeith was a good and just negotiator—a man whose integrity was his most outstanding virtue coupled with cautiousness and gentle-mindedness, round which all other manly virtues fitly clustered—a friend and counsellor, whose loss is deeply felt by his patients, his colleagues, and his fellow citizens."

Dr. MacKeith leaves a widow and a large family. Four of his sons have entered the medical profession.

ROBERT FLETCHER MOORSHEAD, M.B. Durh., F.R.C.S. Eng.

Dr. Moorshead who died on Dec. 4th of double pneumonia after a week's illness had spent his life in the service of the Baptist Missionary Society. Born at Bristol in 1874 he was educated at the medical school there and at St. Bartholomew's Hospital, qualifying M.B., B.S. Durham in 1898 and taking the Conjoint diplomas in the following year. Four years later he went on to take his F.R.C.S. Eng. He had no doubt about his career. In 1902 with Dr. Percy Lush and Sir Alfred Pearce Gould he helped to found the Baptist medical mission auxiliary and was himself largely responsible for creating the interest and support that has now given the Baptist community 16 hospitals with 900 beds in India, China, and Africa. During this time Dr. Moorshead was fully occupied with the details of organising the medical department in the London office but he paid two foreign visits, one to India in 1905–06, the other to China in 1919–20, when he helped to inaugurate the Cheeloo University at Shantung. He was an effective public speaker and a persuasive writer, as may be seen in his books entitled "The Appeal of Medical Missions" and

"The Way of the Doctor" and perhaps still better in the monthly journal *Conquest by Healing* which he edited. He was due to retire in two years' time and had just completed an arduous tour in Scotland which had tried his strength. A colleague writes of him as a man of friendly and sociable disposition who never considered himself. Dr. Moorshead married in 1909 Miss Gertrude Winchester who survives him.

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS

Indian Constitutional Reform and Medical Services

IN the House of Commons on Dec. 10th Sir SAMUEL HOARE (Secretary of State for India) moved a resolution to the effect that the House accepted the recommendations of the Joint Select Committee on Indian Constitutional Reform as the basis for the revision of the Indian Constitution and considered it expedient that a Bill should be introduced on the general lines of the Report.

In the course of the debate on the motion Mr. RAIKES referred to the manner in which the 1919 reforms had worked in regard to the welfare of the masses and peasantry of India, and how the transferred departments had worked. He said that the money spent on education had gone up continuously in the last 15 years, not to provide better education for the peasants, but secondary schools, colleges, and universities into which the peasants never had a chance to go. No doubt the observation was brought before the Joint Select Committee that education had deteriorated in the villages. Let them turn to the medical services. In almost every district of India criticisms were met, not only as to the amount of money spent on outworn and archaic Indian systems of medicine by the gentlemen who had taken charge, but that grants were made to the hospitals and colleges to provide those outworn systems of medicine, which were simply producing the things which would have died out if Indian politicians had not debilitated things. The peasant had to pay for that. It was also generally admitted that political wire-pulling was not unknown in the medical services since transfer. He put it no higher than that.

The debate was adjourned.

Osteopaths Bill

On Dec. 11th, in the House of Lords, Viscount ELIBANK moved the second reading of the Registration of Osteopaths Bill, the purpose of which, he said, was to secure the compilation of a register of osteopaths and the regulation of the practice of the new system of therapeutics in this country. The other object of the Bill was to impose on the practitioners of the system a prescribed standard of professional training and technical competence. The Bill set up a Statutory Board which would keep a registry of qualified osteopaths and supervise admission to the register, and the Board would have the power to prescribe a course of study which would qualify for the practice of osteopathy. There was nothing in the Bill which would enable an osteopath to gain admission to the medical profession. If the Bill was read a second time he would ask their lordships to refer it to a Select Committee.

Lord MOYNIHAN moved the rejection of the Bill. He said it involved the negation of all the principles embodied in the Act of 1858. That Act enabled every person to discriminate between those who had and those who had not passed through the medical curriculum, between the qualified and the unqualified practitioner. If one particular theory of medicine were guaranteed recognition contrary to the Act of 1858 it would not be long before other cults would be making appeals for recognition. The acceptance of this Bill would involve a denial of and hold up to obloquy the whole of the scientific basis of medicine to-day. Osteopathy had no connexion whatever with the main stream of scientific medicine.

Lord DAWSON said that the Bill raised an important question of principle. Medical men were prepared to treat osteopaths as co-workers, but not to give them equality of status in the science of medicine for which they had not had a proper training. For osteopathy to have the status of medicine without the training in pathology would be a public danger. Good as osteopathy was in the proper direction it could be a perfect terror and a tragedy, as he himself knew.

Viscount GAGE (Lord-in-Waiting) replying for the Government, said that if the House agreed to the Bill it would be countenancing the treatment of persons by partially qualified doctors. There was nothing in the law to prevent any person, whether he was a registered medical practitioner or not, from practising osteopathy, or to prevent a union of the more skilled osteopaths compiling a voluntary register and thus trying to gain the confidence of the public. He saw no point in the Government agreeing to send to a Select Committee a Bill with which they absolutely disagreed. He had no authority to consent to the Bill being referred to a Select Committee.

The motion for the rejection of the Bill was negatived by 35 votes to 20 and the Bill was read a second time.

A motion was agreed to referring the Bill to a Select Committee with full powers to call witnesses.

HOUSE OF COMMONS

WEDNESDAY, DEC. 5TH

Boarding-out of Mental Patients

Dr. O'DONOVAN asked the Minister of Health if the Board of Control for England had under its present consideration the boarding-out of rate-aided patients; and how the practice in England compared with the Scottish practice reported on in the twentieth annual report of the Board of Control for Scotland.—Sir HILTON YOUNG replied: This matter is receiving the attention of the Board of Control, particularly in view of schemes which are being put into operation experimentally by certain local authorities. The practice in England cannot, however, be accurately compared with that in Scotland where the conditions and the statutory provisions are entirely different.

THURSDAY, DEC. 6TH

Flogging of Prisoners

Mr. BERNAYS asked the Home Secretary whether, following on the two recent suicides of men sentenced to be flogged, he would consider the advisability of setting up an inquiry into the whole question of this form of punishment.—Sir JOHN GILMOUR replied: I know of only one recent case in which a prisoner's suicide was attributable to the prospect of undergoing a sentence of corporal punishment. If the second case which the hon. Member has in mind is that of a man who committed suicide in Wandsworth prison in 1930, I would remind him that the published reports of the inquest made it clear that it was the thought of having to serve a sentence of ten years' penal servitude rather than the fear of corporal punishment that led the man to commit suicide. I cannot regard either of these cases as furnishing grounds for such an inquiry as the hon. Member suggests.

Mr. BERNAYS: Will my right hon. friend bear in mind the effect of flogging, not only on the victim but on the man who has administered it, on the officials who have to witness it, and on the public in whose name it is done; and is he aware that a great number of people in this country are most anxious as to whether there should not be an inquiry into the question of whether this horrible form of punishment is necessary in the interests of society?

No answer was given.

Mr. BERNAYS asked the Home Secretary the number of cases, if any, which had occurred during the last ten years

in which serious physical injury had been caused by or had followed the infliction of flogging, or in which the prisoner had been kept in hospital for more than two days following a flogging; whether any record had been kept of the subsequent careers of prisoners who had been flogged either by order of the court or for offences against prison discipline; and, if so, what was the percentage of recidivism among these prisoners.—Sir JOHN GILMOUR replied: The experience of the prison medical authorities affords no ground for the suggestion that corporal punishment is liable to result in serious physical injury; in fact, I understand that a prisoner has seldom to be admitted to hospital at all after undergoing such punishment. To discover in what cases, if any, a prisoner has been detained in hospital for more than two days would involve a laborious investigation of records. I regret that I am not in a position to supply the information asked for in the last part of the question, as no special records are kept of the after-careers of prisoners who have undergone this punishment.

Mr. RADFORD: Has the right hon. gentleman statistics to show how long it took the victims to recover from the injuries inflicted upon them in the assaults for which these men have been flogged?

No answer was given.

Public Assistance in Depressed Areas

Mr. BATEY asked the Minister of Health the number of able-bodied persons in receipt of poor-law relief, on the latest available date, in each area covered by the Depressed Areas Bill.—Sir HILTON YOUNG replied: The returns made to my Department do not distinguish able-bodied persons in receipt of poor relief, and moreover, relate to county boroughs and counties as a whole. The figures available are for the numbers of persons ordinarily engaged in some regular occupation, and include their dependants. The figures also include cases in which the primary cause of relief was sickness and not unemployment.

Area.	Average numbers of persons ordinarily engaged in some regular occupation and their dependants in receipt of out-relief during October, 1934.			
	Men.	Women.*	Children.	Total.
County boroughs				
Gateshead ..	2,030	1,522	3,041	6,593
Merthyr Tydfil ..	1,069	816	1,083	2,968
Newcastle-upon-Tyne ..	4,803	3,538	6,689	15,030
South Shields ..	252	133	198	583
Sunderland ..	2,479	1,645	3,061	7,185
Tynemouth ..	415	303	523	1,241
West Hartlepool ..	392	200	338	930
Administrative counties				
Durham	10,359	7,921	14,492	32,772
Northumberland ..	1,708	1,372	2,649	5,729
Cumberland ..	1,165	686	1,130	2,981
Monmouth ..	2,523	1,781	3,375	7,679
Glamorgan ..	6,937	5,557	9,212	21,706
Brecknock ..	253	131	298	682
Pembroke ..	133	93	181	407

* Including dependent wives.

Montague Hospital, Mexborough

Mr. PALING asked the Minister of Health if he was aware that the Montague Hospital, Mexborough, Yorkshire, had recently erected two medical wards by aid of grants from the miners' welfare fund; that these were not able to be opened owing to the reduction of income through unemployment and bad trade in the five urban districts served by this hospital; and, as there were no medical wards at the present time and thus no adequate medical service, in the circumstances would he sanction the payment by the urban authorities, under the Public Health Act, of the product of a 1d. rate to provide a portion of the revenue required until such times as trade improved.—Sir HILTON YOUNG replied: I have no information as to the first two parts of the question. The third question, however, does not arise since my sanction would not be required to a payment by the urban authorities of the amount mentioned in the question.

Meat Inspection

Mr. CONANT asked the Minister of Health whether he proposed to introduce legislation requiring all meat brought into a town in which a public abattoir had been erected to be submitted for inspection before it was sold.—Sir HILTON YOUNG replied: I will bear this matter in mind in connexion with the consideration now being given to the question of the reform of the slaughtering system, referred to in the White Paper of July last as part of the Government's livestock policy.

Durham University Commission

Mr. MARTIN asked the Prime Minister whether he could yet make a statement about the progress of the report of the Royal Commission set up to inquire into Durham University and its constituent colleges.—Mr. MACDONALD replied: I understand that the Commission are engaged in drafting their report which they hope to present in the early part of next year.

MONDAY, DEC. 10TH

Scottish Milk Marketing Scheme

Mr. SHAW asked the Secretary of State for Scotland if he was aware of representations made by the association of Certified and Grade A (T.T.) milk producers in Scotland with regard to the operation of the Scottish milk marketing scheme; and what action he proposed to take in the matter.—Sir GODFREY COLLINS replied: The answer to the first part of the question is in the affirmative. As regards the last part, the representations referred to have been remitted to the Committee of Investigation for Scotland, and every endeavour will be made to expedite a decision upon them. Although I am informed that the Board are prepared to go a considerable way towards meeting the representations, it is impossible for me, pending the report of the committee, to deal with the case of these producers at this stage.

Hospital Treatment and Workmen's Compensation

Mr. TINKER asked the Home Secretary if he was aware of the increasing number of cases that were taken to hospitals for treatment where the accident came under the Workmen's Compensation Act; and would he consider amending the Act so as to provide that the cost of such treatment and the conveyance to and from the hospital should be made a compulsory charge on the employer.—Captain CROOKSHANK, Under-Secretary, Home Office, replied: My right hon. friend is not aware of any such increase. Proposals were considered some years ago, in correspondence with the British Hospitals Association, for requiring employers to pay for the cost of hospital treatment in workmen's compensation cases. On examination, however, it appeared that they would involve great practical difficulties and that there were other considerations to be taken into account, including the possible effect on the employers' voluntary subscriptions to the hospitals; and my right hon. friend does not think this question could usefully be taken up again except in connexion with a general review of the Acts.

Yellow Fever in the Sudan

Sir ROBERT HAMILTON asked the Secretary of State for the Colonies if he had received official intimation of the existence of yellow fever in the Bahr-el-Ghazal province of the Sudan; and what measures were being taken to prevent the spread of this disease into the East African territories.—Sir PHILIP CUNLIFFE-LISTER replied: I received official information of a case of yellow fever that occurred in the Bahr-el-Ghazal province of the Sudan in June last. Measures in excess of those obligatory under the International Sanitary Convention for Aerial Navigation were taken by the Government of the Anglo-Egyptian Sudan in coöperation with the Government of Uganda to stop the spread of infection to neighbouring territories. In particular all aerial navigation from any aerodrome in the Bahr-el-Ghazal province to such territories was prohibited, and aerodromes in the province were closed to all civil aircraft flying within the Sudan. Juba and Malakal were made—and declared—anti-amaryl aerodromes, although there is no reason to believe that yellow

fever exists in these districts. The sanitary staff at Bau in the Bahr-el-Ghazal province was increased in order that every effort should be made to eliminate the mosquito vector. On arrival at any aerodrome in Mongella province aircraft were subjected to the measures prescribed under Article 47 of the International Sanitary Convention for Aerial Navigation. At the request of the Government of Uganda the Sudan Government agreed to subject all aircraft on departure from Juba to the measures prescribed under Article 42 of the Convention. No further special measures of protection on the part of the Governments of the East African territories under the control of the Colonial Office appear to be necessary.

Motor-car Driving Tests

Mr. ANSTRUTHER-GRAY asked the Minister of Transport the number of examiners it was proposed to enlist to conduct the new private motor-car driving tests; how many persons had applied for these posts up to date; and the minimum number of years' driving experience required of applicants.—Capt. HUDSON, Lord of the Treasury, replied: I am sending my hon. friend the form of application which sets out the particulars required to be filled in by applicants for the post of examiners. There have been more than 10,000 applications to date, but my hon. friend is not yet in a position to determine the number of examiners who will be finally required.

TUESDAY, DEC. 11TH

Methylated Spirit Drinking in Scotland

Miss HORSBRUGH asked the Secretary of State for Scotland which local authorities in Scotland had reiterated their appeals to him during the last six months for further regulations to deal with the growing evil of the drinking of methylated spirits.—Sir GODFREY COLLINS replied: During the last six months I have received a representation on the subject from a conference of representatives of the burghs of Aberdeen, Clydebank, Edinburgh, Falkirk, Glasgow, Greenock, Inverness, Paisley, Perth, and Stirling.

MEDICAL NEWS

University of Cambridge

The faculty board of medicine have appointed Dr. G. S. Graham-Smith, F.R.S., Dr. A. N. Drury, and Mr. W. H. Bowen, M.S., to be members of the M.D. committee.

University of Manchester

A full-time post of director of the prosthetics department in the Dental Hospital and lecturer in dental prosthetics in the University has been instituted, and Mr. Ernest Matthews, Ph.D., assistant lecturer in chemistry and demonstrator in prosthetics at Guy's Hospital dental school, has been appointed to it.

University of Bristol

At recent examinations the following candidates were successful:—

M.D.

J. C. Batt.

FINAL EXAMINATION FOR M.B., CH.B.

Part I.—Monica L. Hawkins, Bruno Isserlin (with distinction in pathology), J. S. W. Little, N. R. Matheson (with distinction in materia medica, pharmacy, pharmacology, therapeutics, and forensic medicine and toxicology), Ernest Philipp, L. A. Schnipelsky, Ernest Want, and E. L. Ward.

Part II.—Marion L. Tryon (with second-class honours); R. D. Bodman, J. N. Heales, F. J. W. Lewis, A. J. Matheson, Mary G. Thomas, and Harold James (group I. only).

University of Birmingham

A gift of £5000 has been made to the University by Sir Charles Hyde, president of the Queen's Hospital and the General Hospital, Birmingham. The money is to be used to build and equip a dissecting-room in memory of Sir Bertram Windle, the first professor of anatomy and the first dean of the faculty of medicine. Sir Charles has also given £300 to the University to establish an annual prize, to be competed for by the students of the department of anatomy, which is to be called the Windle prize. Dr. R. F. C. Leith, emeritus professor of pathology, has made a donation of £1000 to found a prize in pathology to be known as the Leith Neumann prize.

South African Medical Services

Speaking at Johannesburg on Nov. 10th, Mr. J. H. Hofmeyr, the minister of public health, announced that Dr. Eustace Henry Cluver is to succeed Sir Edward Thornton as director of medical services for the Union of South Africa. Sir Edward will continue to act as secretary for public health.

Dr. Cluver was born at Robertson, Cape Province, in 1894, and educated at Victoria College, Stellenbosch. Elected to a Rhodes scholarship, he proceeded to Hertford College, Oxford, and took first-class honours in the final honours school of physiology. He was elected to a senior demyship at Magdalen, and at King's College Hospital was Burney Yeo scholar. After qualification he acted as house physician to Sir William Osler at the Radcliffe Infirmary, and then, obtaining a commission in the Royal Army Medical Corps, was attached successively to the South African Military Hospital at Richmond and the First South African Field Ambulance, B.E.F. At the end of the war he was appointed professor of physiology in the University of Witwatersrand, later joining the staff of the union department of public health. He is an associate editor of the *Journal of Industrial Hygiene* and the author of "Public Health in South Africa."

Society of Apothecaries of London: Yeomanry Dinner

The Yeomanry Dinner of the Society of Apothecaries was held on Tuesday last, the new Master, Sir George Buchanan presiding. After the loyal toasts, the Senior Warden, Sir William Willcox, introduced Prof. Langdon Brown to receive the honorary freedom of the Society; in so doing he alluded to Prof. Langdon Brown's particular claim on the Society in that he had been very helpful in establishing the fund for a lectureship in memory of W. E. Dixon.

Sir Edward Hilton Young then proposed the toast of the Society and said that it would be impossible for any Minister of Health to stand before the present audience without bearing testimony to the record of public service of the Master. He alluded to collaboration with Sir George Buchanan in League of Nations work, and stressed the activities of the Society in raising the standard of medical education by the institution of a diploma in obstetrics. In these modern activities, said Sir Hilton, the Society brought itself into contact with regions where service is most needed, as the Ministry was engaged in an effort to improve the conditions of maternity. He pointed out to a medical audience that in exploiting the benefits to be derived from physical culture the British Nation was behind other communities, but added that during the years of office he had learnt to appreciate in the highest manner the services of the medical profession.

Sir George Buchanan, in reply, said that he was admitted to the freedom of the Society by patrimony 44 years ago, but as his father, a good classic, had been an examiner for the Society in 1862, seven years before Sir George's birth, he could claim an association with the Society "in ovo." And now, though grown old in association with the Society, he remained with it because within its rules there was no compulsory retiring age. This was not the case with the Civil Service, but there he had enjoyed nearly 40 years in the public health department, and he expressed his extreme gratification at the presence of the Minister of Health at the dinner, and for his words of encouragement and appreciation. The presence among them also of Mr. Arthur Greenwood, a former Minister of Health, was a great pleasure to him personally. Turning to the affairs of the Society, Sir George said that its history contained many initiatives, and that very many lines of action which it had taken in the past contained the germs of work now discharged by the General Medical Council and by the British Medical Association, particularly because during the last century the Royal College of Physicians of London concentrated its activities on the "closed circle of the physician."

Mr. Arthur Greenwood, proposing the toast of The Guests, said that though the Society had a humble origin, to-day it was recognised in due manner as was shown by this evening's distinguished gathering. "The administration of the public health service of this country is the most fundamental of the services," he said, "for it is upon the health of the people that the existence of the nation

depends. The medical profession is as much concerned with the public wellbeing as the Minister of Health: we are engaged in improving the physique of our people, and have got away from curative medicine and are thinking of prevention." Referring to the Minister of Health's words on maternal mortality, the difficulties, he said, must not be allowed to defeat the medical profession of this country or the desire of the people.

Lieut.-General J. A. Hartigan (Director-General Army Medical Services), in reply, disclaimed belonging to the rare species which liked to make after-dinner speeches, but found it particularly generous of the Society to invite a member of the War Office to the dinner, for during a long correspondence between the Society and the War Office in the last century, it seemed that the War Office had suggested that certain drugs were adulterated. He had failed to find since any record of that assertion being retracted, and he now took this opportunity of withdrawing it. He had read that in the seventeenth century the Society made a grant of £10 for the purposes of the banquet, but that this £10 was not all to be spent on food and some was to be given to the preacher of the sermon. He did not know if there had been any preacher, but the standard of hospitality was being maintained, and the guests were most grateful for their entertainment. Mr. W. Girling Ball also responded to the toast, mentioning that he looked forward to the time when there would be a Government that would prohibit after-dinner speaking. He thought the visitors were "rather a good looking lot," and in thanking the Society mentioned that it had been well rubbed in at St. Bartholomew's Hospital how valuable its work was.

Medical Society of London

The programme of the Medical Society of London during the second half of the winter session has now been issued. It opens with a pathological evening on Jan. 14th, after which, on the 28th, there will be a discussion on the treatment of minor maladies of the foot introduced by Mr. A. S. Blundell Bankart. On Feb. 11th Dr. Robert Hutchison and Dr. H. Gardiner-Hill will open a discussion on body-weight in relation to disease. On Feb. 18th, 27th, and March 4th the Lettsomian lectures will be delivered by Mr. J. E. H. Roberts, who will speak on the surgery of pleural and pulmonary infections. On Feb. 25th a discussion on the value and limitations of radium therapy will be introduced by Mr. Geoffrey Keynes and Mr. Eric Pearce Gould, and on March 11th a discussion on the surgical treatment of syringomyelia by Prof. R. E. Kelly. The next discussion is on March 25th and the subject, introduced by Dr. H. Graham Hodgson, is the future of diagnostic radiology. The last fixture for the session will be the annual general meeting on May 13th, when Sir William Willcox will deliver the annual oration, entitled "Toxic Drugs," their Use and Misuse. The annual dinner will be held early in March.

Post-graduate Lectures at Princess Beatrice Hospital

A series of evening lectures is in progress at this hospital and will continue at monthly intervals during the new year. On Jan. 17th Dr. Stanley Wyard is speaking on the medical aspects of goitre, and on Feb. 21st Dr. Ronald Jarman on modern anæsthesia. On March 21st Mr. Albert Worton will lecture on the fundus oculi in general disease, and on April 11th Mr. Lawrence Abel on the acute abdomen. The lectures will be given in the out-patients' hall (entrance in Finborough-road, London, S.W.) at 9 P.M., and each will be followed by a discussion.

Welsh Board of Health

The Minister of Health has approved the appointment of Dr. Thomas Williams Wade as medical member of the Welsh Board of Health in succession to Dr. D. Llewelyn Williams who is retiring from the public service on Feb. 3rd, 1935.

Dr. Wade, who comes from Llanelly, is one of three medical brothers, all of whom studied at Cardiff and Charing Cross Hospital. Graduating as M.B. Lond. in 1907, he took the D.P.H. in the following year, and was called to the Bar at Lincoln's Inn. He became assistant (later deputy) county medical officer for Monmouth, and subsequently medical officer of health for the borough of Wallsend, in Northumberland. In 1911 he proceeded to the M.D. degree, and in 1921 he was appointed a medical officer of the Welsh Board of Health. He is the author of reports on bacillary dysentery and on tuberculosis among quarrymen.

The death is announced from New York of Dr. Theobald Smith, an epidemiologist of international fame, and the recipient of the Copley medal of the Royal Society and of the Manson medal of the Royal Society of Tropical Medicine and Hygiene.

Central Clinic for Bristol

A central clinic for Bristol is to be erected at a cost not to exceed £43,600. At present there are within half a mile of the centre of the city nine different buildings in which the medical services are housed.

Society for the Study of Inebriety

A meeting of this society will be held in the rooms of the Medical Society of London (11, Chandos-street, W.), on Jan. 8th at 4 P.M., when Dr. Percy Turner, chief medical officer of the Salvation Army, will open a discussion on methylated spirit drinking.

National Birth Control Association

A dinner to raise money in aid of the association will be held next Tuesday, Dec. 18th, at Claridge's Hotel, London. Tickets may be obtained from Mrs. Arthur Croxton, 2, Grosvenor-gardens, S.W.1 (price 25s.), and among the speakers will be Lord Horder and Lady Limerick.

Enlargements at Bolingbroke Hospital

A new administrative block is to be erected at the Bolingbroke Hospital, Wandsworth Common, London, at a cost of £70,000. The present building has gradually deteriorated and is described as unfit to accommodate the nurses or the domestic staff.

Scunthorpe War Memorial Hospital

This hospital has a waiting-list of 350. A start has been made on a new block, which will provide 56 additional beds, and improvements to the balconies have made another 24 available. Some £20,000 is required for this extension.

Bangour Mental Hospital

Lady Thomson, the Lady Provost of Edinburgh, has opened the new £11,000 extension to this hospital, which includes excellent nursing quarters. Some of the nurses have hitherto had to live in lodgings.

Lectures on Cancer

A series of lectures will be held in the lecture theatre of the Cancer Hospital (Free) on Thursdays, at 4 P.M., from Jan. 3rd to April 11th. The lectures will be giveu by members of the staff of the Hospital and the course, for which no charge is being made, is open only to medical practitioners. The subject of the first lecture, to be given by Mr. R. H. Jocelyn Swan, is cancer of the kidney. A programme of the course may be had from the hon. secretary of the medical committee at the Hospital, Fulham-road, London, S.W.3.

Fellowship of Medicine and Post-Graduate Medical Association

Lecture-demonstrations on general medicine will be given by Dr. Clark-Kennedy on Fridays at 4.30 P.M. beginning on Jan. 11th. A series of pathological demenstrations, starting on Jan. 17th, will take place on Thursdays at 3 P.M. at the Wellcome Museum of Medical Science. A series of clinical demonstrations will be given in1935 on the second Saturday of each month; the first will be on Saturday, Jan. 12th, at 3 P.M., at the National Hospital. Queen-square. A special series of surgical tutorial classes will be given on Tuesdays and Thursdays, at 8 P.M., at the National Temperance Hospital, beginning on Jan. 15th. Other courses in 1935 include cardiology at the National Heart Hospital (Jan. 14th to 26th), urology at St. Peter's Hospital (Jan. 21st to Feb. 2nd), diseases of the heart and lungs at the Royal Chest Hospital (Jan. 19th and 20th), and manipulative surgery at the Medical Society of London (Jan. 29th to Feb. 1st). Full details of all courses, &c., which, with the exception of the cardiology course, are open only to members and associates, will be available shortly from the secretary of the Fellowship, 1, Wimpole-street, W.1.

Appointments

EBBS, J. H., M.D. Toronto, has been appointed Pathologist to the Children's Hospital, Birmingham.

POTTER, CARLYLE, M.D. McGill, M.R.C.P. Lond., Fourth Physician to the Evelina Hospital for Sick Children.

WOOD, H. L.-C., F.R.C.S. Eng., Fourth Surgeon to the Evelina Hospital for Sick Children.

Princess Alice Memorial Hospital, Eastbourne.—The following appointments are announced:—

JOULE, J. M., M.D., M.R.C.P. Lond., Hon. Assistant Physician;

ADAMS, J. BODKIN, M.D. Belf., D.P.H., Hon. Anæsthetist; and

GILLETT, F. H., M.B. Camb., Hon. Anæsthetist.

Queen Charlotte's Maternity Hospital.—The following appointments are announced:—

HARDY, T. T., B.M. Oxon., Senior Resident Medical Officer;

CHENARD, A. H., M.R.C.S. Eng., Assistant Resident Medical Officer;

MORRISON, ROSA, M.B. Edin., D.P.H., Resident Anæsthetist and District Resident Medical Officer; and

COX, MARGARET C., B.Sc. Wales, M.R.C.S. Eng., Resident Anæsthetist.

London County Council Hospital Staff.—The following appointments, promotions, and transfers are announced. A.M.O.(I.) and (II.)=Assistant Medical Officer, Grades I. and II. Temp.=temporary.

DAVIS, H. M., M.B. Liverp., D.P.H., A.M.O. (I.), North Western.

COVENEY, M. F., M.B. Sheff., A.M.O. (I.), North Eastern.

WHEATON, C. E. W., M.D., M.R.C.P. Lond., A.M.O. (I.), St. Luke's, Chelsea.

DEWAR, A. F. R., M.D. Glasg., A.M.O. (I.), St. George-in-the-East.

FERRABY, G. S., M.B. Lond., F.R.C.S. Eng., A.M.O. (I.), Lambeth.

BIELENKY, D., M.B. Lond., A.M.O. (I.), Bethnal Green.

EVANS, S. N., M.D. Lond., A.M.O. (I.), St. Mary, Islington.

WILLIAMS, B., M.B., F.R.C.S. Edin., A.M.O. (I.), Mile End.

PAYNE, D. D., M.D. Lond., D.P.H., A.M.O. (II.), North Western.

DAVIES, J. O. F., M.B. Lond., D.P.H., A.M.O. (II.), North Eastern.

WILLIAMS, E. C. P., M.R.C.S. Eng., D.P.H., A.M.O. (II.), King George V. Sanatorium.

ANGLIN, A. F. W., M.B. Toronto, A.M.O. (II.), Colindale.

BATEMAN, L. L., M.B. Belf., A.M.O. (II.), Pinewood Sanatorium.

CRAWFORD, J. W., M.D. Glasg., A.M.O. (I.), Grove Park.

KEY, L. A., M.R.C.S. Eng., A.M.O. (I.), Princess Mary's Hospital for Children.

HART, K. M., M.B. Lond., House Physician, Queen Mary's Hospital for Children.

PHILLIPS, J. W. G., M.B. Lond., F.R.C.S. Eng., A.M.O. (II.), St. Pancras.

O'DOHERTY, A., M.B. Dub., Senior A.M.O. (II.), Southern.

BLACKWELL, U. P., M.B. Lond., D.P.H., Senior A.M.O. (II.), Western.

BROWN, J., M.B., F.R.C.S. Edin., Senior A.M.O. (II.), Dulwich.

KING, E. J., M.D. Lond., Senior A.M.O. (II.), St. Alfege's.

WILSON, S. L., M.B. N.Z., F.R.C.S. Edin., Senior A.M.O. (II.), St. Mary, Islington.

BERRY, P., M.D. Lond., Senior A.M.O. (II.), Lambeth.

CAHILL, J., M.R.C.S. Eng., Senior A.M.O. (II.), Constance-road Institution.

NORRIS, T. St. M., M.B. Camb., M.R.C.P. Lond., D.P.H., Senior A.M.O. (II.), Archway.

CAIRNS, D. R., M.B. Belf., A.M.O. (I.), St. Leonard's.

THOMAS, R. G., M.B. Lond., F.R.C.S. Edin., A.M.O. (I.), St. Olave's.

RUSSELL, A. R., M.B. Glasg., A.M.O. (I.), Brook.

MACFARLANE, L. H., M.D. Lond., D.P.H., A.M.O. (I.), Western.

BROWNE, W. H., L.R.C.P. Irel., A.M.O. (I.), Eastern.

Certifying Surgeon under the Factory and Workshop Acts: Dr. D. C. HOWARD (Burgess Hill, Sussex).

Medical Referee under the Workmen's Compensation Act, 1925: WINFIELD, A., M.R.C.S., for the Birkenhead and Runcorn County Court Districts (Circuit No. 7).

Medical Diary

SOCIETIES

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

TUESDAY, Dec. 18th.

General Meeting of Fellows. 5.30 P.M.

THURSDAY.

Dermatology. 5 P.M. (Cases at 4 P.M.) Dr. R. T. Brain and Dr. I. Muende: 1. Mycosis Fungoides. Dr. L. Forman: 2. Kaposi's Disease.

Neurology. 7.45 P.M. Clinical Meeting at the West End Hospital for Nervous Diseases, Welbeck-street, W. Cases will be shown.

FRIDAY.

Physical Medicine. 5 P.M. Dr. T. Stacey Wilson: Back Pain and Osteopathy. Dr. James Mennell: Manipulation as applied to Sacro-iliac Joints and the Joints of the Spinal Column.

CHELSEA CLINICAL SOCIETY.

TUESDAY, Dec. 18th.—8.30 P.M. (Hotel Rembrandt, Thurloe-place, S.W.), Mr. Cecil Rowntree: Surgery and Golf.

EUGENICS SOCIETY.

TUESDAY, Dec. 18th.—5.15 P.M. (Rooms of the Linnean Society, Burlington House, Piccadilly, W.), Mr. Shepherd Dawson: Disease and Intelligence.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, Wimpole-street, W.

MONDAY, Dec. 10th, to SATURDAY, Dec. 22nd.—BROMPTON HOSPITAL, S.W. Wed. and Frid., Course in Chest Diseases.—MEDICAL SOCIETY OF LONDON, Chandos-street, W. Tues., 2.30 P.M., Dr. A. E. Clark-Kennedy: Low Blood Pressure.—Courses are open only to members and associates of the Fellowship.

CHARING CROSS HOSPITAL MEDICAL SCHOOL, W.C.

SUNDAY, Dec. 16th.—10.30 A.M., Mr. L. G. Brown: Minor Affections of the Ear. 11.45 A.M., Dr. R. A. Hickling: Demonstration of Cases.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL, Gray's Inn-road, W.C.

FRIDAY, Dec. 21st.—4 P.M., Mr. Archer Ryland: Œsophagoscopy.

UNIVERSITY OF LONDON.

MONDAY, Dec. 17th, and WEDNESDAY.—5 P.M. (London School of Hygiene and Tropical Medicine, Keppel-street, W.C.), Prof. F. W. Twort: Primitive Forms of Life. (Brown Institution lectures.)

LEEDS PUBLIC DISPENSARY AND HOSPITAL.

WEDNESDAY, Dec. 19th.—4 P.M., Mr. A. Gough: Tuberculous Glands.

NEWCASTLE GENERAL HOSPITAL.

SUNDAY, Dec. 16th.—10.30 A.M., Mr. J. Collingwood Stewart: Glands in the Neck.

GLASGOW POST-GRADUATE ASSOCIATION.

WEDNESDAY, Dec. 19th.—4.15 P.M. (Royal Infirmary), Mr. J. A. G. Burton: Surgical Cases.

LEEDS GENERAL INFIRMARY.

TUESDAY, Dec. 18th.—3.30 P.M., Dr. Vining: Demonstration of Cases of Children's Diseases.

ROYAL INFIRMARY, Manchester.

TUESDAY, Dec. 18th.—4.15 P.M., Dr. E. B. Leech: Some Medical Conditions of the Small Intestine.

Births, Marriages, and Deaths

BIRTHS

ADDISON.—On Dec. 4th, at Kent Lodge, Westgate-on-Sea, the wife of Dr. G. M. Addison, of a daughter.

BELL.—On Dec. 3rd, at a London nursing-home, the wife of J. G. Yates Bell, F.R.C.S. Eng., of a son.

CORR.—On Dec. 1st, at Clifton-road, Brighton, the wife of J. P. Corr, M.B. Belf., of a son.

HOGG.—On Dec. 2nd, at a nursing-home, Aberdeen, the wife of William J. Hogg, M.B. Aberd., of Aberdeen, of a daughter.

LYNCH.—On Dec. 4th, at Swanscombe, Kent, the wife of Michael Lynch, M.B. Lond., of a son.

POPE.—On Dec. 1st, at Buckingham, the wife of E. S. Pope, M.B. Lond., of a daughter.

SHAPLAND.—On Dec. 1st, at Royal Northern Hospital, London, the wife of Dr. Ronald Shapland, of Slough, Bucks, of a daughter.

WARDROP.—On Dec. 2nd, at Northfield, Rugby, the wife of David Wardrop, F.R.C.S. Edin., of Wellingborough, of a daughter and son.

WILLIS.—On Nov. 29th, at Sussex House, Sutherland-avenue, W., the wife of Saxby Willis, M.D. Lond., of a daughter.

MARRIAGES

CAUGHEY—DU PASQUIER.—On Dec. 5th, at the Church of St. Peter and St. Paul, Fitz, near Shrewsbury, Frederick William Higginbotham Caughey, M.B. Belf., Hans-crescent, S.W., to Mary Kathleen Spenser, widow of Lieut.-Com. F. V. Du Pasquier, R.N.

KERR—MERLIN.—On Dec. 8th, at St. Paul's Church, Knightsbridge, Eric James Kerr, M.B. Birm., of Worthing, to Barbara Anne, younger daughter of Mr. and Mrs. S. P. J. Merlin, of Richmond-mansions, S.W.

MILLES—MARSHALL.—On Dec. 4th, at Brompton Parish Church, Herbert Leslie Milles, M.C., M.R.C.P. Lond., to Ursula Katharine, second daughter of Dr. and Mrs. R. J. Marshall, late of Shanghai.

DEATHS

BAXTER.—On Dec. 8th, at Alderley Edge, Andrew Baxter, M.D. Aberd.

BIRD.—On Dec. 6th, at Whitchurch, Glam., Ashley Bird, M.R.C.S. Eng., aged 78.

DAVIES-COLLEY.—On Dec. 10th, at 16, Harley-street, Eleanor Davies-Colley, M.D., F.R.C.S., Senior Surgeon to the South London Hospital for Women and Surgeon to the Marie Curie Hospital, aged 60, second daughter of the late J. N. C. Davies-Colley, M.C. Cantab., F.R.C.S., Surgeon to Guy's Hospital, and grand-daughter of the late Thomas Turner, Treasurer of Guy's Hospital.

DREW.—On Dec. 3rd, at Blatchington, Seaford, Henry William Drew, F.R.C.S. Eng., aged 76.

MACKEITH.—On Dec. 5th, at Southampton, Alexander Arthur MacKeith, M.B. Glasg., aged 68.

MOORSHEAD.—On Dec. 4th, at Sutton, Surrey, Robert Fletcher Moorshead, M.B. Durh., F.R.C.S. Eng., aged 60.

SEAR.—On Dec. 1st, at St. Thomas's Hospital, London, John Taylor Sear, M.D. Brux., of Orchard-court, Worcester Park, Surrey.

SMITH.—On Dec. 4th, at Bournemouth, after a long illness, Horace Smith, M.D. Camb.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts

A SURVEY OF WATER RESOURCES

SPEAKING to the Institution of Water Engineers on Dec. 7th, Sir Hilton Young gave particulars of a proposed national survey of water resources. This survey would be carried out under the supervision of an independent committee appointed with the coöperation of the Department of Scientific and Industrial Research and other departments. The committee would start with the information already collected by the Ministry of Health and the Geological Survey; this collection would be extended to obtain records from every available source—water undertakers, catchment boards, canal companies, electricity undertakers, mine owners, and other business concerns using large private supplies. In many cases, he said, gauging of the flow of streams is not at present undertaken, or, where undertaken, is not sufficiently accurate. The task of the committee would be to guide the survey in the collection of information, to advise on its progress, and on measures necessary from time to time for its improvement. Sir Hilton added that he would shortly be in a position to state the composition of the committee. This announcement by the Minister of Health preceded by a day or two the publication of the seventh annual report of the Water Pollution Research Board (H.M. Stationery Office, 9*d*.) which again emphasises the importance of river gauging as a preliminary to any effective action in controlling the discharge of sewage and trade wastes. Two years ago the British Association appointed a committee to inquire into the position of inland water survey in the British Isles, and the Minister's action may be regarded as the first fruits of its endeavour.

WIRELESS FOR HOSPITALS

A FUND has been established to provide the means of fitting wireless headphones beside every hospital bed in this country. It is felt that doctors, nurses, and hospital workers will appreciate the benefit that the wireless can bring to patients who need change of thought and contact with the outside world, and the council of the fund hope that members of the medical profession will bring the project to the notice of all who may be interested. To instal headphones by every bed, and at the same time replace obsolete equipment in institutions where it was provided some years ago will cost, it is calculated, about £150,000. The appeal is being made by the *News Chronicle* Wireless for Hospitals Fund, with Sir Walter Layton as chairman, and offers of help, whether by the distribution of collecting sheets or by the display of collecting boxes, will be gratefully received by Mr. Philip Inman, chairman of the appeals committee of the fund, at Shell-Mex House (Rooms 254–256), Victoria Embankment, London, W.C.2.

BOOK TOKENS.—An ingenious scheme has been formulated by the National Book Council whereby an intending donor of a book is relieved of the responsibility of choosing the gift. A "Book Token" of any desired value is purchased at a bookshop and is sent to the recipient, who can then exchange it at his own bookshop for a book of his own selection to the value of the token. The token itself is not unlike a Christmas card, costs 3*d*., and bears a stamp to the value of the book to be given.

AN EXHIBITION OF MICROSCOPES. — Messrs. W. Watson and Sons are staging for the second time an exhibition of microscopes, at the Central Hall, Westminster, from Dec. 10th to 15th. One hundred microscopes will be arranged to display specimens illustrating biology, pathology, bacteriology, and nature study generally, and there will be each day at 4 and 6.30 P.M. a lantern lecture or cinematographic display. On Saturday, at 5.30 P.M., Mr. W. E. Watson Baker will lecture on "How Lenses are Made."

Vacancies

For further information refer to the advertisement columns

Aberdeen University.—Lecturer in Morbid Anatomy. £400.
Aylesbury, Royal Buckinghamshire Hospital.—Second Res. M.O. At rate of £150.
Bath, Royal Mineral Water Hospital.—Hon. Physician.
Birkenhead County Borough.—Consulting Psychiatrist and Consulting Aurist. Each £200.
Birmingham, Selly Oak Hospital.—Jun. M.O. £200.
Bolton Royal Infirmary.—H.S. £125.
Brighton, Royal Sussex County Hospital.—H.S. £150.
Bristol Eye Hospital.—Asst. Res. H.S. £100.
Bristol General Hospital.—Two H.P.'s, Two H.S.'s, Res. Obstet. O., H.S. to Spec. Depts. Each at rate of £80. Also Cas. H.S. At rate of £100.
Burton-upon-Trent County Borough.—Deputy M.O.H. £600.
Bury County Borough.—Asst. M.O.H. £500.
Central London Ophthalmic Hospital, Judd-street, W.C.—Sen. and Jun. H.S. £120 and £100 respectively.
Chelmsford and Essex Hospital.—Hon. Anæsthetists.
Chesterfield and North Derbyshire Royal Hospital.—H.S. At rate of £150.
Connaught Hospital, Walthamstow, E.—H.S. At rate of £100.
Derbyshire County Sanatorium, near Chesterfield.—Res. Asst. M.O. £350.
Dover Borough.—Asst. M.O.H. £750.
Durham County Council.—Deputy County M.O.H. £960.
Edinburgh Royal Infirmary.—Second Pathologist. £300.
Exeter, Devon Mental Hosp., Exminster.—Jun. Asst. M.O. £350.
Gloucestershire Royal Infirmary and Eye Institution.—Res. Surg. O.
Great Yarmouth General Hospital.—H.S. £140.
Harrow Urban District Council.—Asst. M.O.H. £600.
Hospital for Epilepsy and Paralysis, Maida Vale, W.—Two Med. Regs. Each £100.
Hospital for Sick Children, Great Ormond-street, W.C. Res. M.O. for Country Branch. At rate of £150.
Ilford, King George Hospital.—Res. Med. and Surg. O.'s. Each £250. Also Cas. O. At rate of £150. Also H.P. and H.S. Each at rate of £100.
Ipswich, East Suffolk and Ipswich Hospital.—H.P. £120.
Kingston and District Hospital.—Jun. Res. M.O. At rate of £250.
Lambeth Hospital, Brook-street, S.E.—Asst. M.O. £350.
Liverpool, Smithdown-road Hospital.—Res. Asst. M.O. £200.
L.C.C.—Asst. M.O.'s for Infectious Hospitals. Each £350.
London University.—Chair of Physiology at St. Mary's Hospital Med. Sch. £1000.
Lowestoft, St. Luke's Hospital.—Asst. M.O. £350.
Manchester, Monsall Hospital for Infectious Diseases.—Second Res. Asst. M.O. £350.
Manchester, Northern Hospital for Women and Children.—Sen. and Jun. H.S. £130 and £80 respectively.
Manchester, St. Mary's Hosp.—Three Hon. Asst. Obstet. Surgs.
Margate and District General Hospital.—Res. M.O. £150.
Middlesex County Council.—Tuber. M.O. £750.
Newcastle-upon-Tyne Eye Hospital.—Jun. Res. H.S. £100.
Newcastle-upon-Tyne, Royal Victoria Infirmary.—Hon. Surgeon.
Paddington Hospital, Harrow-road, W.—Sen. Asst. M.O. £500.
Princess Elizabeth of York Hospital for Children, Shadwell, E.—H.S. At rate of £125.
Radium Beam Therapy Research, Radium Institute, Riding House-street, W.—Asst. M.O. At rate o f£250.
Reading, Royal Berkshire Hospital.—Two H.S.'s. Also Cas. O. Each at rate of £125.
Rochester, St. Bartholomew's Hospital.—H.S. At rate of £175.
Royal College of Surgeons of England.—Two Examiners in Dental Surgery.
Royal Eye Hospital, Southwark, S.E.—Hon. Asst. Surg. Also Part-time Bacteriologist. £100.
St. George's Hospital, S.W.—Res. Anæsthetist. £100.
St. James' Hosp., Ouseley-road, Balham, S.W.—Asst. M.O. £350.
St. Mary's Hospital, W.—Physician for Nervous Diseases. Also Clin. Asst. in Dept. for Dis. of Skin.
Salisbury General Infirmary.—H.S. At rate of £125.
Sheffield Royal Hospital.—Res. Anæsthetist. Also Res. Asst. Cas. O. Each at rate of £80.
Sheffield Royal Infirmary.—H.P., Ophth. H.S., Asst. Cas. O. Also Asst. Aural and Ophth. H.S. Each at rate of £80.
South-Eastern Hospital for Children, Sydenham, S.E.—Jun. Res. M.O. At rate of £100.
South London Hospital for Women, Clapham Common, S.W.—Clin. Assts.
Tasmania, Flinders Island Municipality.—Res. M.O. £300.
Tilbury Hospital.—Med. Supt. £200.
West Ham Mental Hospital, Goodmayes.—Consultant and Operative Surgeon. 100 gns.
West London Hosp., Hammersmith-road, W.—Hon. Asst. Radiol.
Willesden General Hosp., Harlesden-road, N.W.—Res. Cas. O. At rate of £100. Also Hon. Clin. Assts. for Out-Patients' Dept.
Wilts County Council.—County Tuber. O. £750.
Wolverhampton Royal Hospital.—H.S. At rate of £100.
Worcester County and City Mental Hospital, Powick.—Asst. M.O. £350.
York, Friends' Retreat.—Jun. M.O. £300.

The Chief Inspector of Factories announces vacancies for Certifying Factory Surgeons at Hawick, Roxburghshire; Eardisley, Herefordshire; Ebbw Vale, Monmouthshire; and Stone, Staffs.

Medical Referee under the Workmen's Compensation Act, 1925, for the Beverley, Bridlington, Goole, Great Driffield, Kingston-upon-Hull, Pocklington, and Selby County Court Districts (Circuit No. 16). Applications should be addressed to the Private Secretary, Home Office, Whitehall, London, S.W.1, before Dec. 31st.